Exploring Teachers' Experiences of Educational Technology: a Critical Study of Tools and Systems

Andrew Clapham

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In memory of Sid Clapham, Councillor, Lord Mayor and activist

In memory of Rose Clapham, homemaker and political sceptic

In memory of Michael Marland, Head teacher, colleague, and educationalist

In memory of Paul Grant, music lover, cricket lover and life lover

Abstract

In this project I explore two teachers' experiences, as 'key informants', of educational technology in a UK inner-city comprehensive school. I examine the meditational role of technology in these teachers' activities and suggest that such an examination can improve what we understand about educational technology at the school. I discuss how technology is socially shaped and therefore not neutral, and of technologically mediated change being ecological change (Postman, 1992). I examine discourses of 'techno-romanticism' which locate technology as a transformational panacea for educational challenges - discourses which seemingly ascribe technology its own agency. This thesis challenges such viewpoints, and the technological hegemony they support, by examining technology not as state-of-that-art but as the 'state-of-the-actual' (Selwyn, 2010a).

The project was an in-depth examination of the experiences of two key informants using a case study, ethnographic research design, with interview and observational methodologies generating qualitative data. I have positioned the project as both critical in its examination of technology, and sociocultural in its epistemology – in particular drawing on Sociocultural psychology (Wertsch 1991) and Cultural Historical Activity Theory (CHAT) as the theoretical framework, and 'activity theory' (Engeström, 1987b, 1999a) as the analytical lens. The analysis has two stages – the first being a 'grounded theory' (Glaser & Strauss, 1967) coding and categorisation of contextual data; the second the modelling of activity systems, and the identification of contradictions and conflicts in those systems.

My analysis is of the key informants' experiences, provides a reading of how technology mediates not just the 'what' of these teachers' activities, but also the 'how' and 'why'. I challenge the dominant discourses and assumptions of the inevitability of technological improvement. In doing so, I call for the educational technology research community to be both sympathetic toward what technology means for these teachers' professional identities, and critical of overly technocentric school environments.

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Abbreviations

BECTA – British Educational Communications and Technology Agency

BTEC - Business and Technology Education Council

CHAT – Cultural Historical Activity Theory

CMIS - Common Management Information Service

DDL - Drop-Down List

Dsub - D Subminature connector

EVD - Electronic Visual Display

FFT – Fisher Family Trust

GUI - Graphical User Interface

HOF - Head of Faculty

IWB – Interactive White Boards

LCDP - Liquid Crystal Display Projector

MAM - Module Assessment Meeting

NM - New Managerialism

NS – Network Services

OfSTED - Office for Standards in Education, Children's Services and Skills

PMR - Performance Management Review

ROF – Read-Only File

RTR - Real Time Reporting

SAA – Significant Adult Ambassador

SLT – Senior Leadership Team

SST - Social Shaping of Technology

SWO – Student Welfare Officer

TPC – Tablet Personal Computer

YLL – Year Learning Leader

List of figures

List of tables

List of Images

List of Appendices

Contents

Exploring Teachers' Experiences of Educational Technology: a Critical Study of Tools and Systems

Is it surprising that prisons resemble factories, schools, barracks, hospitals, which all resemble prisons? (Foucault, 1991, p. 228)

Chapter 1: Introduction

1.1 Opening words

Technology in learning, teaching and education has been the focus of political debate, media scrutiny and research within the United Kingdom and further afield. The 'complex relationship between culture and technology' (Bowers, 2000, p. 109), encapsulates the focus of this project - I am concerned with examining relationships between teachers, technology, tools and systems. Such a focus is not however part of what might be called mainstream educational technology research. The prevailing questions in educational technology discourses are 'mostly at the technician's level' (Conlon, 2000, p. 109) - questions such as "Is Macintosh better than Windows?"; "Why won't my computer read your file?"; "How much faster is this new technology over the old model?". Rather than positioning educational technology research within a cultural frame, the effectiveness and impact of technologically mediated production of learning has been the dominant model.

This overriding technical focus is a position which Neil Selwyn (2010a, p. 66) challenges by suggesting the need for research to explore how technology has been used by teachers, 'for better and worse' in their everyday tasks. In this project I examine the 'messy realities' (Selwyn, 2010b, p. 4) of technology in schools. I am not interested in technology in the computer programmer's laboratory, or on the hardware designer's test bench, but in relation to the duties, tasks and undertakings teachers are required to conduct in their working lives. This project is an examination of technology not as state-of–the-art, but in terms of the 'state-of-the-actual' (Selwyn, 2010a, p. 70). One of the claims I make for this study is that it addresses a gap in current educational technology literature regarding a lack of what Selwyn (2010b, p. ix) describes as 'critically informed' educational technology research.

Exploring how teachers use technology reveals the mediating relationship between technology, pedagogy, teachers' beliefs and 'professional identities' (Coldron & Smith, 1999, p. 711). Such an exploration also reveals how technology does, and does not, mediate, teachers' 'activities'

(Leontiev, 1974, p. 10). I generate and analyse models of 'activity systems' (Engeström, 1999a, p. 33) which depict how technology mediates the object, rules, communities and divisions of labour of these systems. I examine how technologies which supposedly mediate learning and teaching inside the classroom for example, Tablet Personal Computers (TPC), intranet portals and computer data management systems, have become part of what Rudd (2001, p. 221) suggests is the increased 'monitoring and evaluation' of students, schools and teachers – an environment which results in a 'culture clash' (Goodson, *et al*., 2002, p. 19) between technology and teachers.

This project explores the experiences of two key informants - one male, one female - in a UK, state, inner-city, comprehensive school. These teachers' experiences are examined within, and with attention toward, the culture of the school in which they work. The data relating to the key informants is supplemented with that generated by other members of the school community, as well as from documents, photographs, and the school's intranet - this approach is taken so as to articulate more fully the experiences of the two main teachers in the study.

Educational technology research claiming a 'critical' warrant might be expected to explore issues of ethnicity, class and gender. However, as in this project, such research can also focus on examining technologically mediated systems and activities through a 'sociocultural' framework (Wertsch 1991, 1998), and more specifically, Cultural Historical Activity Theory. It is important to be clear as to why this was the approach taken. I was always interested in examining, in as much detail as possible, teachers' experiences of technology. As a sole researcher - and with consideration of the limitations incumbent with this - I decided that the best way to achieve the required level of detail was to use a small sample focussing on two key informants.

Due to the small sample, the key informants' ethnicity, class and gender were embedded in their identities as individuals, rather than as representative of gendered, class or ethnic groups. I explored the experiences of one male and one female, and I might have looked at differences between them - this could have mediated an approach where I compared findings with broader gender work so as to look for patterns. However, due to the sample, it would not

have provided a sufficiently robust means for attributing causation and effect to gender. Consequently, approaching these considerations *per se* did not seem to be a fruitful avenue of investigation – hence my sociocultural approach, where I focused on teachers' activities and the systems which surrounded these, as the units of analysis.

Class and gender have obvious, and well researched, consequences for technology (see for example Ward Schofield, 1995; Cockburn 1999) however these two issues were not made prominent in the data. It thus appears that neither gender nor class was an issue for either of the key informants with regard to their experiences of educational technology. This might to some extent be a function of my data generation strategy. I am not of course saying that these considerations have not impacted on both these teachers rather in my analysis, I moved away from explicitly identifying such issues. Having both a single white male and single black female, as key informants naturally lends a gendered view to the work – as it might be argued for class and ethnicity as well. However, I imagine that if I were to remove the identification of which teacher said which comment it would not be immediately obvious as to what was the gender of the respondent.

My decision to take a critical approach to exploring technology was underpinned by MacKenzie and Wajcman's (1999, p. 1) assertion that technology is 'socially shaped', and 'non-neutral' (Furr *et al.,* 2005, p. 277). Technology is both influenced by, and influences, society and culture – influences which are reflected in the key informants' experiences of the technologies studied here. From utilising such an approach, this project is my attempt to understand educational technology within the micro culture of the school in which it is set, and with regard to some of the wider macro levels incumbent in the society it serves.

There is one final point to be made here. I am not suggesting that technology in schools is not a good thing, clearly it is. Nor am I suggesting that the school which is the setting for this project is in a form of technological 'meltdown', where technology mediates the hindrance of teachers in every task in which they participate. A critical examination of educational technology is a beneficial rather than unconstructive reading of technology in schools (Selwyn, 2010b, p. ix). I am not 'anti-technology'; my aim for this project is to explore teachers'

experiences of technological mediation in a highly technology-laden school. In doing so, I discuss some of the consequence of such mediation which make teachers' work more difficult. This was not a premeditated focus, I did not deliberately set out to find how badly educational technology worked. What I did set out to do was explore what technology meant to teachers who frequently used. Educational technology research has an important role in acting as a counteractive view point to the techno-centric commentary surrounding technology in schools (Selwyn, 2010b, p. ix) - this is a role I hope this thesis takes on.

Defining technology

Before discussing substantively 'educational technology' it is important to define what this term encompasses. When I discuss educational technology I do not mean exclusively computers or computer peripherals - often I am not directly discussing computers *per se,* more the effects of technology. Technology can mediate both physical and virtual realities:

> ... technology absorbs people in a virtual reality, it deadens them to those who are actually nearby. The resulting social autism adds to the ongoing list of unintended human consequences of the continuing invasion of technology into our daily lives. (Goleman, 2006, p. 8)

Technology also has an element of 'checks and balances':

> Technology offers the potential to make life easier and more enjoyable; each new technology provides increased benefits. At the same time, added complexities arise to increase our difficulty and frustration. (Norman, 1999, p. 31)

For Cuban *et al* (2001, p. 813), supporters of educational technology position it as having determinism attached to it which mediates an inevitably positive outcome to the activity in which it is used:

> Most policy makers, corporate executives, practitioners and parents assume that wiring schools, buying hardware and software, and distributing the equipment throughout will lead to abundant classroom use by teachers and students and improved teaching and learning.

Surprisingly perhaps Cuban *et al*'s position is echoed by Bill Gates:

> Technology is just a tool. In terms of getting the kids working together and motivating them, the teacher is the most important. (Gates, 1997, no page)

Technology is also a tool which mediates power:

> Machines are worshipped because they are beautiful, and valued because they confer power; they are hated because they are hideous, and loathed because they impose slavery. (Russell, 1928, p. 28)

In light of these different understandings of technology, it is necessary to be clear as to what technology is, and to outline some of the relevant features within such apparently different (and sometime conflicting) definitions:

> Technology consist of a basic purpose or function, materials, energy source, artefacts/hardware, layout, procedures (programs, software), knowledge, skills, qualified people, work, organisations, management techniques, organisational structure, cost/capital, industry structure (suppliers, users, promoters), location, social relations and culture. (Fleck & Howells, 2001, p. 525)

Technology in school encompasses a broad church of sometimes not apparently interlinked elements. Technology can be both physical and abstract. A ruler is a technology, so too a book or a room - technology can be a norm, system, or a tool used to accomplish a task. A spread sheet might transform from a learning tool in one environment, to mediating an administrative system in another. Defining artefacts as educational technologies, or learning technologies, suggests differing context in which these technologies are located:

> ...artefacts that mediate the encounters of *deliberate* learning can be termed 'educational technologies', or 'learning technologies'. Here, we prefer the latter phrase. It is less familiar but therefore it comes with fewer connotations. 'Educational technology' risks limiting discussion to those institutionalised versions of deliberate learning that make up schooling, whereas here we are keen to explore technology-mediated continuities between in-school and out-of-school experience. (Crook & Lewthwaite, 2010, p. 437)

Selwyn (2010b, p. 5) similarly defines educational technology as those technologies which mediate the formal, compulsory, structures of education such as schools. I define educational technology as any technologies – computer or otherwise - that mediate teachers' formal and institutionalised activities. For example, teachers' activities might be mediated by a mobile technology such as a TPC. Teachers move around with their work and technology allows them to do so. Consequently, even when a teacher works at home, if the tool which mediates their activity is part of the formal structures of the 'school', I am defining this as an educational technology.

I argue that examining what form technological mediation can take in different contexts reveals the relationship between teachers and technology, and between technology and teachers. To investigate technology in educational settings researchers need to explore how teachers reflect on and implement, technology in their working lives (Katic, 2008, p. 159). Katic's focus on teachers experiences is supported by Zhao *et al* (2001, p. 296), who take the view that technology needs to be seen in terms of teachers' 'personally constructed conceptions'. Such conceptions are important as the expectations of those designing, manufacturing and selling educational technologies might not be reflected in teachers own conceptions as to what activities these technologies can, and cannot, successfully mediate.

To investigating how teachers use, understand and experience technology, I write 'narrative portraits' (Stronach & MacLure, 1997, p. 34) which reveal how teachers conceive technology mediates their activities – I include in the text data from interviews, observations, images, documents and the school's intranet which contextualise the key informants' experiences. For example, in Chapter 4, I discuss a teacher's experiences of a computer mediated coursework assessment system and the relationships she describes between technology, truth and trust. In Chapter 5, I investigate a spread sheet mediated teacher performance management system where a teacher discusses technology as a tool of control and his anger, shame and despair because of this.

At the core of educational technology is a remit of 'improving schools' (BECTA, 2009a, no page) and with it an improvement of learning and ultimately education. Such improvement is reflected in the 'optimistic culture' (Goodson, *et al.*, 2002, p. 2) prevalent in educational technology discourses – a culture prevalent despite technology led educational innovation being realised, as Crook (2001, p. 19) writes, 'much more slowly than innovators themselves predict'. The contrast between the trajectory of technologically mediated change in actuality, and that predicted by 'innovators', is an example of the focus of this project. I ask why this might be the case; why has change taken longer than expected? Why has the result not necessarily been the expected one? Why has change not happened at all?

To partly answer these questions, I am suggesting that the interrelationship between technology, society, culture and political ideology reflects the social shaping of technology (MacKenzie & Wajcman, 1999, p. 1). Within this model the connection between what activities technologies are supposedly able to mediate - and what activities these tools actually mediate in practice - in an organisation such as a school is complex and not necessarily predictable. Consequently, as part of this social shaping, I am examining educational technology within social, economic, cultural and political landscapes. From considering these landscapes, and to critically examine teachers' experiences of educational technology in their activities, I ask three research questions:

- What is it like for teachers to use educational technology?
- Why do teachers use educational technology the way they do?
- What are the consequences of using educational technology?

These research questions are shaped by the wider educational technology debate - they are also are situated in 'personal input' (Ball, 2006, p. 5). This thesis has arisen from my own experiences of working as a teacher in inner city schools, and my interest in the technologies mediating my activities. As my teaching career progressed, technology seemed to be positioned as a 'magic wand' which would improve learning, attainment, efficiency and behavior. However, these claims for educational technology made by government, manufacturers and management did not seem to be borne out in my own experience. I was concerned that it was technology *itself* which was being ascribed agency to bring about educational change rather than the teacher. This is not to say that technology was not advantageous as clearly it was, however technology appeared to mediate conditions where as many challenges were forthcoming as those it solved. I wanted to try to understand why this might be the case. Like Ball (2006, p. 5), I suggest that the personal is central to a research project such as this. Consequently, in the following section I write a short biography in an attempt to reveal some of this personal input. This is a personal and historical narrative to

communicate my voice as a researcher through identifying a 'feature-set' of influences and experiences which formed this voice.

1.2 Developing the focus

I have two objectives in the following brief description of my experiences of educational technology. First, to address some of the assumptions and influences which have led me to approach the research in the way I have. Second, to begin to address the fundamental question - why conduct the research? In answering the first of these questions I suggest that the project might be important, it might inform, it might change educational technology for the better at the school in which it is set. The answer to the second question is more personal and is contained in the following paragraphs.

Throughout my teaching career, I have been intrigued by the how technology both mediates learning, and the activities which constitute teachers' professional lives. For example, I remember attending a Continuing Professional Development (CPD) session when I was a Newly Qualified Teacher (NQT) working in my first post in a school called Woodview in London's East End. The thrust of the session was toward the 'paperless school' where students would use computers instead of text and exercise books; where libraries would be 'virtual', and students and teachers would communicate electronically.

When I reflected on this proposed technological revolution of education, I was struck by what might be some of the implications. I wondered if students and teachers were to communicate with each other electronically, how would this impact on the face-to-face relationships I had been told by my University lecturers were essential to teaching in schools such as mine. I wondered how the many students in my school who struggled to read and write would be supported by a technological system based on words. I wondered that if information was to be freely and widely available from all over the world, then what would be the provenance of that information. It was questions such as these which were part of my interest in educational technology. The potential for technological hardware and software to mediate a radical alteration of schools and learning fascinated me - however it was how technology might mediate a radical alteration of teachers' activities which was my main concern.

My first experiences of using 'educational' technology were in the transition period of the early 1990s which led the Sinclair ZX Spectrum and the BBC microcomputer to be replaced by the 286 and 386 Personal Computer (PC). This movement from dial-up modems and the BASIC operational systems to a Windows based system was part of my initiation as a teacher. So also was the dearth of access to these machines. Although Woodview had 1,200 pupils and 40 teachers, there was one 386 computer in the staffroom for general use, and one in the Mathematics, English and Science Departments respectively. Fast forward twenty years and this is in stark contrast to the setting for this project, where there was a one-to-one ratio between students and the TPCs the school provides.

Technology at Woodview was part of the exciting new possibilities for education. Teachers would queue to use the PC in the staffroom to produce resources for their lessons. The PCs assigned to the three departments were in constant use, wheeled as they were on a trolley from room to room, complete with printer. Technology was being established as a tool which teachers wanted to use; however technology was not a focus itself. Technology was designed to help students learn – teachers saw technology as having huge potential for mediating many different tasks - but at Woodside it was primarily a tool for learning. There were no attempts to link the use of computers with increases in attainment; educational technology was to be used as and when teachers thought fit.

After working at Woodview, I moved to North Westminster Community School (NWCS). NWCS was the school serving the Paddington, Lisson Green and Marylebone areas of Central London, and at which Michael Marland was head teacher. Michael was a teacher who had a huge impact on me. It was Michael who positioned students as full members of the community and who championed the staff at the school. Technology was a part of NWCS, but as important to the school's ethos was an emotional dimension to learning, risk-taking, and an acknowledgement of practical, physical, relational and experiential learning. The levels of access to educational technology at NWCS increased rapidly over the four machines at Woodview. NWCS was in the London Borough of Westminster, which was considerably more affluent than the Borough of Newham, where Woodview was situated. Moreover, the increased acquisition and access to educational PCs in the UK between the mid-90s to early 2000s resulted in educational

technology having a far greater presence at NWCS than Woodview. One room in three had a standalone PC (these were eventually networked), and there were computer 'farms' which contained 24 PCs. Teachers did not have their own PC, but most offices had PCs installed for shared use.

Despite the differences in access and provision of educational technology, both Woodview and NWCS shared the same philosophy concerning the purpose of computers. When I taught at NWCS computers were still positioned as tools for learning, with no linkage between technology mediating conditions of increased efficiency, production or attainment. As Marland (2002, p. 7) argued, even though the Qualifications and Curriculum Authority (QCA) called for Information and Communication Technology (ICT) to be 'woven' into all school courses, at NWCS, the same had to be said for the social, artistic and ethical. In Marland's model, educational technology was part of the school, and was clearly a powerful tool; however, it was certainly not the overriding focus of teachers' activities.

I then moved from NWCS to the third school in my biography - Brampton High. This school is the setting for this project, and where I taught for eight years. Brampton is a school with a state-of-the-art educational technology provision; every classroom held 24 Laptop Computers, had its own Interactive White Board (IWB) and Liquid Crystal Digital Projector (LCDP), along with the peripherals and software to support them. At Brampton my interest in educational technology became almost evangelical. I eagerly integrated as many pieces of hardware and software into my lessons as were available. I followed the management's suggestion that I should communicate with students via the intranet and be sat behind my laptop during lessons. I used technology to produce and analyse data relating to students who were underachieving, and planned intervention programmes where specific software applications would be used to boost their grades.

Brampton High was indicative of the modern UK state comprehensive school. It was also a school that seemed to be losing sight of the things which were vital to students and teachers - happiness, contentment, wellbeing and emotional health. As these were ephemeral phenomena, which existed outside the realms of easy quantification and therefore easily

transformed into data, they just simply seemed to disappear from the running of the school. My conclusion was that the more technology the school had, the more technology appeared to be the dominant discourse. It was at Brampton that my interest in educational technology changed from that of a teacher to that of a researcher.

Brampton is a technology-laden and results driven modern school which more than complies with the positioning of technology as a tool which mediates educational success. It represents a prime example of the 'brave new world' that education is being led toward. Brampton High, far from being a backwater, is a pioneer institution, and hence I am ideally placed to be a researcher examining such educational technology in such a setting. My influences prior to working at Brampton gave a contrast between this school and those which did not comply with such a technological model. I have highlighted aspects of my experiences which seemed to be lacking in Brampton's technologically mediated model; an emotional dimension, risk-taking, an acknowledgement of the practical, physical, relational and experiential learning. During my teaching career I have experienced how rich the teacher's experience can be. And yet here, at Brampton's veritable paradigm of the technological progress, I found myself feeling there were many aspects lacking.

Having the opportunity to research teachers' experiences of technology was a major catalyst for my leaving the teaching profession; however there were a number of other reasons that I left. Some of these reasons underpin the mandate for writing this thesis. Perhaps, unsurprisingly, these reasons are negatives. Overwhelmingly, I had become disillusioned as to the point of education. It seemed to me that education was no longer about learning – that is learning in the most experiential and open-ended form – instead it was concerned with identifying and reducing discrete skills to be measurable and outcome orientated.

These outcomes were increasingly critical in evidencing a school's 'success'. For example, the Office for Standards in Education, Children's Services and Skills (OfSTED) identification of at least 30% of a school's final year cohort achieving five, A*-C grades at GCSE, or an equivalent, including English and Mathematics. It seemed to me that all these indicators of success appeared to reveal was a 'one-size-fits all' approach to education, learning, teachers and

students. Despite my reservations, I found myself actively participating in this system. I used technology as much as I could - I focussed on GCSE C/D borderline students, I set up extension classes just for these kids, I taught to the test, I produced and analysed data. I became unhappy, depressed and ill.

When I have discussed this project with friends, fellow researchers and academics I have experienced a range of reactions regarding the focus. The majority view seemed to be one of the inevitability of what I might 'find out' – for them of course technology was a good thing, and teachers and schools were better for it. However, there were two distinct 'camps' into which the members of Brampton's staff I talked to about technology fell. The largest camp challenged the techno-centric view of those outside of the school, and the 'sanguine air of technological determinism' (Selwyn, 1999b, p. 77) prevalent in the discourses of media and government. This camp disputed the appropriateness of the huge capital investment in technology and its effectiveness in mediating non-quantifiable phenomena such as trust, relationships, and happiness. The other camp supported the technology which mediated many of the school's tasks and objectives through highlighting the imperative of good examination performance – performance they maintained which would be raised by the students' use of technology. Perhaps tellingly, this second camp consisted entirely of members of Brampton's management team.

1.3 Signposting the structure

In this section I signpost the structure of this document and go into more detail about what sits where.

In Chapter 2, I present a review of literature relevant to my research questions - this was not a linear process. My experiences of conducting the research, and my analysis of data led me to explore literature on new managerialism of education, teacher identity, teachers' communities and how technology mediated different approaches to pedagogy. Before beginning the project these were not areas I would have explored. The process of conducting the research, of engaging with the literature, and of reviewing the research questions, resulted in an iterative development of the literature review. Consequently, my research questions not only guide

the focus of what I ask, but also define the 'landscapes' into which the project is set. These landscapes act as the boundaries for my examination of the literature.

In the first of these landscapes, I review literature relevant to my research question "what it is like to use technology"? I focus specifically on the concept of 'pedagogy' and the effects of technology in mediating teachers' personal pedagogy and the 'complex theories' (Bruner, 1999, p. 11) they absorb in the course of their practice. Examining technology and pedagogy is also in response to calls in the research community (see for example Nixon, 2003; Pitman, 2002; Zhao, 2003) for investigations into the intersections between technology, teachers' beliefs, practices, and professional identities (Katic, 2008, p. 166).

In the second landscape, I examine literature relevant to my question "Why do teachers use technology the way they do"? In exploring this question, I draw on MacKenzie and Wajcman's, (1999, p. 1) description of the social shaping of technology (SST) I have briefly discussed here. I particularly examine technological determinism (Fleck & Howells, 2001, p. 526) and the impact of a post Fordism (Merson, 2001, p. 81) free market, globalised, 'knowledge economy' (Facer & Sandford, 2010, p. 75). I examine a culture Whitty (2001, p. 165) calls 'new managerialism' and its effect on schools. I focus on the work of Ball (2003, p. 215) and Lyotard (1979, p. 47) regarding 'performativity' and its role in demonstrating the achievement of benchmarks, allocations and achievements (Goodson, *et al*., 2002, p. 20). I examine the performance focused, and audit-led assessment of teachers (Hargreaves, 2002, no page).

In the final landscape, I review literature relevant to my question "What are the consequences of using educational technology"? I examine the relationships between educational technology and teachers' 'educational identities' (Moore, *et al*., 2002, p. 551). I investigate how educational technology mediates teachers' 'informal and formal communities' (Woods, 1995, p. 93) – specifically how these communities have become what Hargreaves (2003, p. 59) presents as 'contrived', and leading toward teachers' 'isolationism' (Troman, 2000, p. 344).

I begin Chapter 3 by writing narrative portraits (Stronach & MacLure, 1997, p. 34) of the key informants. I describe these teachers and reveal some of the events and influences, which are part of how they experienced educational technology. I describe the school the research is set

in, and the area the school serves, to give 'thisness' (Thomson, 2002, p. 73) to the research setting. I discuss the design, methodologies and analysis I have used underpinned by my reading of a sociocultural CHAT theoretical framework. I establish the research design as both qualitative and ethnographic, and consider the implications of conducting ethnographic research. I examine the methodologies I have used for data generation, particularly participant observation and interview, and discus the processes for gaining access to the school and constructing the sample. I develop the claims that I make for data, and discuss reliability, validity and trustworthiness then establish my analytical model through 'grounded theory' (Glaser & Strauss, 1967) coding of contextual data, and activity theory analysis of activity systems. I write a brief chronological background of activity theory from its roots in the work of Vygotsky and Leontiev to the 'second generation' (Engeström, 1987b) model used here. I then establish the process for my analysis, and describe how I synthesised my analysis of the teachers' data to suggest similarities in their experiences of technology at the school.

The first of three analysis chapters is Chapter 4. This is the first chapter in which I substantially reveal some of the experiences of one of the key informants, and supplement these with data generated by a number of their colleagues. In this chapter I include a range of data in the form of photographs, observations and intranet screen shots (a screen shot is an image taken of the visible item displayed on a computer monitor). For example, I examine one the key informant's discomfort and disillusionment stemming from the consequences of what she considers the failure, and her resulting mistrust, of technology and data. I explore technological hardware mediating change in what she once considered to be a supportive system into an oppressive one and the effect of 'real-time' data access to teacher/parent relationships.

In Chapter 5, I explore some of the second key informant's experiences. The model I use in this chapter mirrors that of the previous one – I include data from a number of sources and from this I classify concepts and categories within the data and use these to identify activity systems. I examine how for this second informant, technology at Brampton is complicit in mediating ideological threat, pressure and change which undermines the emotional 'glue' which holds Brampton together. I discuss how a software package mediated the assessment of

teacher performance and how a 'virtual' tutorial system effected the school's pastoral care commitments.

In Chapter 6 I 'synthesise' the analysis of the previous two chapters to present 'petite generalizations' (Stake, 1995, p. 7) – I give an overview of my analysis of the key informants' experiences of technology. In the first section, I examine parallels between concepts, and establish four overarching categories. I explore the similarities between data in each category, and present statements that encapsulate the key informants' contextual experiences of technology. In the second section I synthesise my analysis of activity systems. I begin by summarising the activities I have examined, and identifying the tools which both teachers use to mediate their activities. I establish if these tools are hardware, software or Internet-intranet-portal systems. I then examine the similarities between how technology mediates the contradictions which prevent the key informants from attaining their objects. The concluding stage in this chapter is to develop generalised model of educational technology mediation. In this model, I examine the key informants' activities and look for similarities in the technological mediation of objects, rules, communities and divisions of labour. This process leads to an understanding as to why there are certain experiences of using technology which are shared by both teachers.

In my final chapter I evaluate the project and my analysis. I suggest some thoughts on moving educational technology forward - I sum up and reflect. I present localised findings as to why the key informants' experienced technology as they did. I discuss how the school's educational technology appeared to mediate conditions of performativity; that the relationship between the school, teachers and technology was not in isolation from cultural and social influences; that educational technology did not inevitably mediate the empowerment of some of teachers who worked there; and that educational technology did not inevitably mediate teachers' relationships or communities. I conclude the thesis by presenting a set of conclusions, and possible changes, to the meditational role of technology at the school.

1.4 Summary of key themes chapter 1

In this opening chapter, I have 'set the scene' for the project. I have described how the mainstream of educational technology research focuses on technical questions regarding compatibility, output and attainment. Central to this chapter has been my positioning of this project as outside of this mainstream approach - as a critical examination of technology. I have described how accessing the work of authors such as Selwyn (2010a, 2010b) supported me in the research. I have discussed SST and that technology is not neutral. I have begun to position this project as challenging the accepted view of educational technology which appears both deterministic and ascribes technology its own agency. I have defined the term educational technology and highlighted the sometimes blurred boundaries between tools, systems, processes, hardware and software. I have presented my research questions, established these questions as supporting my critical view, and discussed why these are the questions I have asked.

I have acknowledged what technology means to me, and the focus for the project, through writing a brief biography. My aim was to discuss some of my experiences of educational technology and the people and events that impacted on me and defined my position as both teacher and researcher. I gave some context to the assumptions, biases and ideologies of my researcher voice and revealed a 'feature set' of concepts which underpinned the project. I discussed apparently opposing technological philosophies. First, was the philosophy shared by two schools which, whilst embracing technology, held experiential, emotional and physical learning central to their ethos. This was in opposition to the final school I discussed - the 'modern' technology laden school which was the setting for this project.

I concluded this chapter by outlining the structure of this document and some of the challenges, contexts and structures prominent in the project. I briefly indicated what sat where and delineated the flow of my argument from chapter to chapter.

Chapter 2: Reviewing the literature

Synopsis of chapter 2

In this chapter, I present a review of literature relevant to the research questions I discussed in Chapter 1. I focus on educational technology literature within three different landscapes. First, I analyse literature relating to my research question "what it is like to use technology"? I examine how technological 'affordances' (Norman, 1999, p. 9) mediate teachers' practice. I discuss the relationships between technology and the mediation of teachers' pedagogy through 'complex theories' (Bruner, 1999, p. 11). In this section I examine not what it should be like to use technology, but what it is like.

Second, I examine literature relevant to my question "why do teachers use technology the way they do"? I discuss what MacKenzie & Wajcman (1999, p. 1) call the social shaping of technology (SST); a tendency to privilege the 'artefactual component of technology' (Fleck & Howells, 2001, p. 526); the impact of the conditions of a free market globalised model of education (Merson, 2001, p. 81) and new managerialism (Whitty, 2001, p. 165). I consider what Stephen Ball (2003, p. 215) and Jean-François Lyotard (1979, p. 47) describe as 'performativity' - particularly, how technology can mediate an educational climate led by a performative culture focusing on outputs, efficiency and production (Goodson, *et al*., 2002, p. 20).

In the final landscape I examine literature relevant to my question "What are the consequences of using educational technology"? I explore how societal changes, such as those arising from the introduction of new technology, redefine teachers' educational identities (Moore *et al*., 2002, p. 551). I analyse literature discussing how educational and technological reform impacts on 'communitas' (Woods, 1995, p. 93), and how such reform leads to teachers becoming increasingly isolated from the support of colleagues and affirming social relationships (Troman, 2000, p. 344). In this section I examine what happens when teachers use technology.

2.1 Technology and pedagogy

Of the many large-scale research projects exploring technology in education (see for example, Harrison *et al*., 2002; Watson, 1993), the focus has been on linking technology to attainment, rather than what teachers consider to be the advantages and disadvantages of such technology. This is at odds with the view that *both* the merits of computers as classroom tools, and the qualitative issues embedded in what Cuban (1986, p. 91) calls the 'artistic and subjective side' of teaching, need to be considered by educational technology researchers. To examine my research question "what it is like to use technology?" I explore technology in teachers' activities through a change of emphasis:

> The vast bulk of the literature on IT in education is prescriptive, uncritical and techno-romantic. Education research on IT has hardly started to investigate what is happening in the classroom, and it lacks a critical dimension; there is a need for a paradigmatic shift from its narrow technical emphasis. (Benyon & Mackay, 1989, p. 246)

This uncritical view of educational technology research is one which is still prevalent (Selwyn, 2010a, p. 65); this is not to suggest that all educational technology research is both uncritical and techno-romantic, but that the focus in the majority of such research is on a narrow technical emphasis. In this opening section of my literature review, I examine the 'affordances' (Norman, 1999, p. 9) of technology - that is the perceived and actual properties of specific technological applications - and teachers' 'actual practice' (Loveless, 1996, p. 448).

I analyse literature relevant to the effect of technology on the development of teachers' pedagogy and what Bruner (1999, p. 11) calls the 'complex theories' of practice. The relationships between pedagogy, culture and technology can be positioned as central to engendering excellence in learning (John & Sutherland, 2005, p. 405). However, despite the increasing ubiquity of educational technology, it can still be an 'outsider' in pedagogy (Watson, 2001, p. 251). To explore the mediating relationship between technology and pedagogy – and indeed if technology is an outsider to pedagogy - it is important to examine what pedagogy itself might mean.

Pedagogy is an expression of extents of professional knowledge (Loveless, 2003, p. 313). For Cloke and Sharif (2001, p. 9), pedagogy shapes teachers' 'behaviours in the classroom' -

behaviours underpinned by the beliefs teachers hold (Higgins & Mosley 2001, p. 191). The importance in the association between teachers' beliefs and their pedagogy is similarly reflected in the relationship between technology and pedagogy. Beliefs play an essential role both in teachers' classroom practices, and the adoption (or non-adoption) of technology in that practice (see for example, Borko & Putnam, 1995, p. 38; Clarke & Yinger, 1987, p. 117).

Beliefs and structures

Whilst pedagogy is related to teachers' practice, teachers' beliefs can be seen as:

> Eclectic aggregations of cause and effect propositions from many sources, rules of thumb, generalizations, drawn from personal experience, values, biases and prejudices. (Clark, 1988, p. 5)

Clark's eclectic aggregations form the beliefs which locate pedagogy into the models teachers hold of desired states in the classroom (Brown & McIntyre, 1993, p. 17). Consequently, teachers' ideas and beliefs impact on the pedagogical choices as to how educational technology is both viewed and used (Higgins & Moseley, 2001, pp. 194-195). As Loveless (2003, p. 316) indicates, there are links between teachers' epistemological beliefs and their practices with technology - to explore teachers' experiences of educational technology, it needs to be placed in a 'pedagogic context' (McCarney, 2004, p. 71). For example, teachers who recognise the pedagogical potential of technology appear to relate technology to their own beliefs and philosophical underpinnings (Watson, 2001, p. 259) – to understand what it is like for teachers to use technology it is important to explore what they believe technology to be.

The connection between technology, pedagogy and personal beliefs are part of Woods' (1999, p. 75) identification of teachers' 'pedagogical realignment'. This realignment is where teachers' personal held theories beliefs and practices are aligned (or realigned) with the demands of technology (John & Sutherland, 2005, p. 409). Realignment comes from a process where teachers' use of technology reflects their beliefs about teaching and learning (Drenoyianni & Selwood, 1998, p. 92). Rather than technology sitting outside pedagogy, teachers' beliefs reflect how and why they choose to use technology. The relationships between beliefs, experiences and realignment of pedagogy are, as Katic (2008, p. 159) presents, can be

mediated by technological affordances, as well as through teachers' 'conceptions of technology' which might:

> …be informed by general conceptions, by conceptions of learning and teaching (especially if technology is introduced in an educational setting), or they may be functions of other kinds of influences. Technological conceptions may be nested in conceptions of learning or teaching or may not necessarily be a part of them. Likewise, personal histories may play a foundational role or a merely related role in an individual's conceptions of technology. (Katic, 2008, p. 159)

Conceptions of technology underpin whether teachers see technology as changing the nature of their subject, or if it is another 'classroom artefact' (Cloke & Sharif, 2001, p. 10). Teachers' experiences of technology are inextricably linked with their conceptions of technology - conceptions which can transform not only their pedagogy, but also their professional identities and working practices (see for example Pearson & Naylor, 2006, p. 284).

The implications of this transformation of pedagogy, identities and practices are reflected in a culture clash between teachers and technology (Goodson *et al*., 2002, p. 19). Teachers' conceptions of technology might suggest to them that technology is a tool inappropriate for mediating some educational contexts. However, the culture of the school in which they work might position technological mediation as *always* appropriate – thus there is a tension, clash or conflict between the corporate culture of a school and teachers' conceptions of technology. Similarly, teachers' conceptions of technology might suggest that technology requires a reorientation of curriculum, procedural or organisational norms, whereas their school might position technology as mediating and reinforcing these norms.

There appears two possible ends to such a continuum. For example, Underwood and Brown (1997, p. 75) posit that educational technology can have the potential to mediate conditions which support teachers' pedagogy within the current framework of schools. However, in contrast, Honey and Moeller (1990, p. 88) suggest, that unless teaching practices and school frameworks change, technology will not be integrated into classrooms due, in part, to a mismatch between teachers' professional beliefs and what they consider as the 'value' of technology.

Whether technology is supported by, or thwarted by, the 'traditional' structure of educational organisations is up for debate. However, some commentators suggest that the introduction of technology into the rigidity of the UK education system will inevitably result in numerous tensions (Pearson & Naylor, 2006, p. 284). Such tensions are linked to the reliance of successive UK governments since 1997 on 'high-stakes' test results which have underpinned a risk-averse culture of teaching to the test, with the innovative use of technology being difficult (or impossible) to enact. There appears a paradoxical position where progressive experimentation in education (and the potentially central role of technology in mediating this experimentation) has been replaced by a set of re-invented 'traditional' pedagogies (Ball, 2006, p. 69).

This apparent paradox, of technology mediating an educational *status-quo,* is reflected in Watson's (2002, p. 60) identification of a need not of merely a retooling agenda for schools, but a 'reforming' one. The retooling of schools with educational technologies is in itself not enough to reform the entrenched structures of a performance driven educational system. The fabric of schools and schooling inhibit the potential of technology, and as such technology is not a change agent but a tool for mediating a reinforcement of traditional structures. Although technology is perceived as a catalyst for change, the symbolic function of educational technology might sit uncomfortably with teachers' professional judgements (Watson, 2001, p. 251).

Teachers are not necessarily impressed by pedagogical change which only appears to focus on what the technology can do, its applications and affordances, as opposed to what technology *does do* (Watson, 2001, p. 251). Rather than teachers simply being intransigent or technophobic in their understanding of technology, they instead reject its 'emblematic' meditating functions as too removed from their own pedagogical position (Watson, 2001, p. 261). The two most influential factors effecting the degree to which teachers adopt educational technology are not perhaps unexpected – that is, usefulness and ease of use (see Barton & Haydon, 2006; Cox *et al.*, 1999; Davis *et al*,, 1989). Consequently, teachers being portrayed as technophobic and intransigent, ignores the importance of pedagogy - allied with the

pragmatic demands of teachers' activities - with regard to how technology is, or is not, assimilated into their practice (Cuban, 1986, p. 4).

A consequence of technology in schools is 'that a fundamental purpose of schooling [which] is to learn to know, is being swept aside by the need to acquire information' (Watson, 2001, p. 256). Consequently, using a computer to mediate learning can be located within a technology facing pedagogic cultural agenda (Watson, 2001, p. 261), In such a culture, knowledge and reflection, whilst still important, are less prevalent than a technocentric approach, lauding technological dexterity and the attainment of skills (McCarney, 2004, p. 70). For Bryderup *et al* (2009, p. 365), such a movement from reflecting upon learning experiences to skills, has changed teachers' pedagogy from 'a lifelong learning model to a traditional model of teaching and instruction'.

The reorientation of schools, via a technocentric approach, from lifelong learning to instruction is part of a technologically mediated reorientation of teachers' pedagogy, beliefs, and professional identities. Such a transformation of identities and practice is reflected in teachers conceding trade-offs between technology and their pedagogy (John & Sutherland, 2005, p. 410). For example, technology has mediated changes in teachers' pedagogy through their responsibilities of managing students' on-line behaviour (Hope, 2005, p. 370) - teachers change what they are doing, or how they are doing it, not for educational or pedagogical reasons but for technical ones. The affordances of a technology mediate how the user interacts with the tool. Teachers gaining access to a new technology (at potentially great expenses) might experience a need to use the technology as much as possible, not to 'waste it'. The effect of this however can be a fundamental change to how teachers teach – for example, John and Sutherland (2005, p. 411) suggest that the use of IWB technology can lead to teachers being drawn toward particular sets of teaching strategies.

The implications of the rules surrounding technology can also direct how particular tools mediate particular activities. For example, a teacher who uses technology to mediate the freedom of 'explorative' learning might find their pedagogy in tension with the restrictions of systems – such as Internet 'firewalls' - which might prevent such an approach. This trade-off

between technological freedom and constraint is reflected in the UK Government's concerns about 'e-safety' (Sharples, *et al*., 2009, p. 70), as outlined in documents such as *Safeguarding Children Online* (BECTA, 2009b). Changes in teachers' pedagogy became dictated to through Government guidelines and an context of technological control rather than freedom (Cloke & Sahrif, 2001, p. 16). Technology does not necessarily mediate changes to teachers' pedagogy in isolation, but needs to be accompanied by measures that stimulate and encourage such change (Oliver & Dempster, 2003, p. 45). Moreover, it is not a given that technological change will either occur at all, or in the event that it does occur, be universally beneficial, as teachers can be both strengthened and hindered by the technological tools they choose to use (Katic, 2008, p. 157). The pedagogy of technology should have a greater emphasis in how teachers understand technology is part of their beliefs as to what technology can do, and perhaps more importantly what technology is for (McCarney, 2004, p. 61).

The effectiveness of technology is dependent on teachers' understandings of the pedagogy of technology as a learning tool – especially as technology can mediate both teachers' pedagogy and the administration and management of learning (Dwyer, *et al*., 1991, p. 50). If, for example, pedagogy revolves around the acquisition and processing of information, then technology is an ideal tool. If however, pedagogy is located in 'physical world' experiential, emotional learning, then technology might not seem so appropriate. It is essential that the pedagogy underpinning technology is both a main focus of teachers' use of technology in their classrooms, as well as educational technology research exploring these uses (McCarney, 2004, p. 71).

2.2 Technology and society

My second research question asks, "Why do teachers use technology the way they do"? In exploring this question, I focus on three different factors. First I examine SST (MacKenzie & Wajcman, 1999, p. 1) and technological determinism (Fleck & Howells, 2001, p. 526). Second, the impact of a post Fordism (Merson, 2001, p. 81) free market globalised model of education and new managerialism (Whitty, 2001, p. 165). Thirdly, I discuss 'performativity' (Lyotard,

1979, p. 47; Ball, 2003, p. 215), and how technology mediates an educational climate of 'benchmarks, quotas and goals' (Goodson, *et al*., 2002, p. 20).

SST holds a middle ground between the polar ends of a continuum, where at one end 'technological determinists' champion the power of technology to transform society, and at the other 'social determinists' posit that society and economy transform technology (Lenert, 2004, p. 238). Technological determinism can be seen in terms of 'privileging the artefact' where technology is positioned as:

> …more important than, or separable from, the specific social context that must also be part of a technology. (Fleck & Howells, 2001, p. 526)

In such a climate of technological determinism, technology supposedly develops as the result of its own internal dynamic (and in isolation from any other influences) and changes society to fit with its own patterns and procedures (Winner, 1999, p. 29). When such a technologically deterministic outlook is adopted:

> …the latest technological innovations, such as the Internet, are depicted as a force outside history and politics. Moreover, futurists often portray the industrialists and scientists of the emerging communication technologies as guardians of the public interest rather than as a technological elite usurping social and economic power. In extreme versions of this line of thinking the Internet is, by itself, a force that will bring freedom, prosperity, and enlightenment. But the optimists often miss an important point: new technologies create new opportunities, but they also generate new problems. (Lenert, 2004, p. 238)

For Dugdale, (1999, p. 321), technological determinism gives 'far too much weight to technological change in explanations of social change'. Dugdale's position is supported by MacKenzie and Wajcman (1999, p. 3), who suggest that technological determinism rests on the assumption that technologies follow a 'logic of their own which then effect society'. Dugdale's definition of technological determinism - in which the power of social change is ascribed with technology rather than those who use the technology – is an important one. Positioning technology as deterministically outside of society privileges tools *themselves* as transformational, rather than the agency in education being with teachers supported by technological tools (Fisher, 2006, p. 301).

Whilst technological determinism indicates that technology can be seen as isolated from - and external to – society, SST rejects the idea that technology can be examined separately from society (Lenert, 2004, p. 240). Central to SST is the lack of an *a priori* distinction between what technology can do and its social context (Callon, 1986, p. 200) – technology and society are interrelated and interdependent:

> [SST] investigate[s] the ways in which social, institutional, economic, and cultural factors shape the direction and rate of innovation, the form and content of technological artefacts and practices, and the outcomes of technological change for different groups in society. (Williams & Edge, 1996, p. 870)

SST treats technological change as a continuing process from the development of technology to its implementation in a setting (Clausen & Yoshinaka, 2004, p. 243). This continuing and interlinked process results in the co-construction of technology and society – co-construction which can be seen in the technological mediation of large technical and cultural systems such as the Internet, and small applications such as texting on a mobile phone.

Politics of technology

The varying degrees of technological mediation reflect the co-construction of technology and society, where:

> ….all our lives are intertwined with technologies, from simple tools to large technical systems. (MacKenzie & Wajcman, 1999, p. 4)

Technical systems are deep seated in the conditions of society through the 'politics' of technological artifacts (Winner, 1999, p. 28). Such conditions lead to a fundamental part of the positioning of technology as social shaped through the 'non-neutrality of technology' (Furr *et al*., 2005, p. 277). Technology is imbued with political, social, economic and epistemological residues – the non-neutrality of technology is reflected in the associations between technology, politics and power:

> At issue is the claim that the machines, structures and systems of modern material culture can be accurately judged not only for their contributions of efficiency and productivity, not merely for their positive and negative environmental side-effects, but also for the ways in which they can embody specific forms of power and authority. (Winner, 1999, p. 28)

As Winner continues, underpinning the relationship between technology and society is the political nature of technology:

> …the adoption of a given technical system unavoidably brings with it conditions for human relationships that have a distinct political cast – for example, centralized or decentralized, egalitarian or inegalitarian, repressive or liberating. (Winner, 1999, p. 33)

Educational technology is as much a gesture of political intent as a tool for learning (Cuban, 2001, p. 158). In the United Kingdom, the use of technology to mediate teaching and learning has been a key component of government education policy (McCarney, 2004, p. 62). Computer technology in UK schools has been part of the remits of successive Conservative, Labour and Coalition Governments since the formation in 1967 of the National Council for Educational Technology (NCfET) - which subsequently became the now defunct British Educational Communications and Technology Agency (BECTA). It was not until perhaps 1980, which signalled the:

> …early commercial production in the UK and US of home computers as well as a growing media interest in new technologies, 1980 can be seen as a distinctive 'turning point' in the UK's relationship with information technology. (Selwyn, 2003, p. 354)

It was only in 1982, that the UK Government made a large-scale commitment to introduce computers to schools (Younie, 2006, p. 386) – a commitment reflected for example in the Conservative Government's commissioning in 1983 of the first national assessment of educational technologies through the 'ImpacT Report' (Watson, 1993).

Prior to the 1997 general election, the UK Labour party commissioned the Stevenson Report 'Information and Communication Technology in UK schools' (Stevenson, 1997). This report was an important part of framing the roles and expectations for educational technology in the policies of the following Labour Government. For example, it was Labour's commissioning of figures such as Stevenson which led to a rebranding that changed the previous accepted term Information Technology (IT) to (ICT) Information and Communications Technology (Selwyn, 2008, p. 703). As Younie (2006, p. 386) indicates, part of Stevenson's recommendations was to identify the need for a cohesive national strategy for educational technology. Labour was concerned about the lack of evidence indicating a 'positive causal relationship' (Machin 2007,

p. 1146) between computers and pupil performance, and Stevenson's identification of the 'primitive' state of ICT in UK schools (Younie, 2006, p. 386).

This primitive state was used by Stevenson to position the UK's educational technology as part of the 'digital divide' which characterised the gap between the technological 'haves and have-nots' (Fjørtoft, 1996, p. 402). Stevenson suggested that many state schools were on the wrong side of this divide, particularly those in socio-economically deprived areas (Underwood, 2007, p. 215). Labour positioned itself as the party which would address this technological inequity through a programme of social justice and equality - for the Labour Government, technological inequity became the focus of both political debate and governmental ideology (Tomlinson, 2003, p. 195).

As well as educational technology mediating a closure of the digital divide, fundamental to Labour's reading of Stevenson was that teachers could have access to, and be members of, an 'online connected learning community' (Selwyn & Fitz, 2001, p. 127). This was as part of the UK's first national ICT strategy embodied in initiatives such as the 'National Grid for Learning' (NGfL). Labour envisioned the NGfL as a network of schools and teachers supporting each other within a managed 'learning grid' (DfEE, 1997a, p. 2). NGfL was part of a network which supposedly connected educational institutions and teachers together (Selwyn, 1999a, p. 56). However, the NGfL was not necessarily greeted with the response Labour had hoped:

> Along with the general fetish for standardized, quick-fix, packaged programs, resources, and remediation services that currently beset performativity-driven public education, NGfL the grid works against teacher work as symbolic analysis. (Goodson, *et al*., 2002, p. 121)

Educational technology initiatives such as NGfL were seen not as part of a process of social justice, but as a process of analysing, standardising and directing teachers. The drive toward such a standardised educational model can be seen in the relationships between technology, education and an educational model driven by 'free market globalisation' (Thompson, 1998, p. 5). For example, the Department for Education and Employment (DfEE) positioned technology in schools as a central part of addressing the demands of the global economy (DfEE, 1997b, p. 3). Educational technology was itself established as a 'policy narrative' (Selwyn, 2008, p. 703)

for Labour. The Blair Government positioned technology in UK school as representing an ideological base which aimed to address social exclusion, and stimulate a 'technologically-rich knowledge economy' (Facer & Sandford, 2010, p. 75). This notion of knowledge-based economy was a central remit for Labour's view of educational technology and was a theme running through many of the Government's policies (Moss & O'Loughlin, 2005, p. 165). Underpinning these policies was an ideology which demanded that education empowered citizens who could operate in this global, technological, economy.

Labour's drive toward such a global knowledge based economy was underpinned by its positioning of educational technology as a meditational tool, and educational attainment as an outcome of this tools use, within a target driven climate (Selwyn, 2008, p. 704). What this climate meant in practice, was that Labour's commitment to educational technology was justified through an 'excess of standards' (Tomlinson, 2003, p. 197) which, in part, attempted to support educational technology, and Labour's commitment toward it, as a crucial tool for modernising education (Facer & Sandford, 2010, p. 74). The linking of educational, and technological, success through standards and testing was part of Labour's response to not only globalisation, but also a reflection of the Government's commitment toward a 'free market' educational model which had four main features:

> …a commodity is produced which has a use value for the consumer (student, parent, employer) and exchange value for the producer (teacher), there are relations of exchange between producer and consumer, there are relations of competitions between individual producers, and there are particular role behaviours expected from producers (e.g. competitiveness) and consumers (e.g. the drive to maximise utility). The key to market success is consumer demand and satisfaction, and this can only be achieved if the 'community' meets the needs and expectations of consumers. (Smyth, *et al.*, 2000, pp. 39-40)

In such free market, value would be led by the demands of the market - the competitiveness between producers in the free market elevates the importance of technologies which mediate, in this case, the teacher, to produce more efficiently the commodity (examination success) that the consumer requires. The relationship between state and market establishes, and assess, teachers' work in terms of output measures which, as Ball (1994, p. 51) indicates, are in turn are set against 'the cost in time, class sizes, and resources, required to produce the commodity'.

The technological mediation of this relationship between input and output is part of 'embedding educational instruments of production' (Apple, 1986, p. 32). The free market is based on technological tools to increase production; in such a model technology-based education not only increases social inclusion but also economic effectiveness (Selwyn, *et al*., 2001, p. 265). An essentially market-based education system is linked to technology through the objective of increased productivity and efficiency (Whitty, 2008, p. 165). Technology in education is not necessarily linked directly to mediating learning as an outcome - technology also has the objective of mediating organisations such as schools, and the *process* of learning in those schools, more efficient (Postman, 1993, p. 171).

An educational model where teachers are recognised as producers, and students, parents and employers as consumers is one which is underpinned by technology (Marginson, 1995, p. 296). The connection between technology, education and free-market production, establishes tools such as computers, not as means of revolutionising learning and schools, but as no more than means for augmenting productivity (Cuban, 1986, p. 88). The technologies mediating a free-market education system, located schools themselves as technologies which served the economy by producing learning as a commodity for consumers (Cuban, 2001, p. 8). As Cuban continues (2001, p. 11), the use of Standard Assessment Tests (SATs) was not as a representation of learning but as '*de-facto* profit sheets'. The free-market educational model confirmed both education, and learning, as commodities, and as such influenced by the 'market episteme' (Ball, 2006, p. 74).

New Managerialism

Supporting the free market educational model has been a movement toward 'new managerialism' (Clarke & Newman, 1994, 1997; Clarke & Gertwitz, 2000). New managerialism (NM) can be seen as private sector management practices which have been applied to the public services under the guidance of government and its agencies (Deem & Brehoney, 2005, p. 219). For Whitty (2001, p. 165), NM evolved from the neo-liberal, and neo-conservative, elements of the 'New Right' – NM is both technical, and political, and cements relations of power and dominance between manager and worker (Deem & Brehoney, 2005, p. 217). New managerialism is connected to regulation from the state and, which Miller (1988, p. 43)

describes, as representative of a 'business management syndrome' reflecting governmental aspirations to take models of private sector management and apply them to public services. Key to the NM model is that there is a particular set of underpinning and transferable rules and norms, which, for those advocating NM, lends it as both appropriate to the public sector, and representative of the need for increased 'professional accountability' (Leaton Grey, 2006, p. 14) within education and other public services.

Within the NM model there is a 'feature set' of characteristics which focus on:

> …emphasising the primacy of management above all other activities; monitoring employee performance (and encouraging self-monitoring too); the attainment of financial and other targets; devising means of publically auditing quality of service delivery and the development of quasi-markets for services. (Deem & Brehoney, 2005, p. 220)

Smyth (2001, p. 130) suggest that the primacy of management in such a model is reflected in 'a low level of teacher trust; [and] a fetish for bench-marking and measurement of outcomes'. In NM, performance and output is entrenched in a commercial-style of organisation structure and management:

> …the new public management emphasis on such things as explicit standards/measures of performance, greater emphasis on output controls, the breakup of large entities into smaller units, market-type mechanisms, the introduction of competition and a stress on a professionalised commercial style management. (Whitty, 2001, p. 164)

The effectiveness of NM in the business world is justified through the elevated status of standards, measurements and performance. These 'technologies' mediating NM are central to the success, or failure, of the model. Moreover, the use of standards and performance measures are technologies which are applicable to different contexts - the rules, norms and practices which define the approach to management are seen as being applicable from setting to setting:

> It [NM] is offered as value-free and 'technicist' and hence unproblematic: so there are no problems anticipated in transferring this model of management from, say, a building society to a primary school. (Merson, 2001, p. 78)

Merson's position is supported by Mahony and Hextall (2001b, p. 175), who similarly claim that the advocates of NM see no difference in the requirements of managing a school from that of a bank:

> Managerialist ideologies are fundamentally grounded in the notion that there exist sets of principles and procedures, which can be applied to bring about 'effective, efficient and economic' modes of operation. In devising effective operational structures, specific contextual circumstances have to be taken in to account, but the working presumption is that the general principles are pre-eminent and circumstances subsidiary. This is a highly contentious and value-laden point since to most people on the ground it is precisely this *context* which gives meanings and flavour to their actions and lives.

New managerialism therefore is seen by its proponents as an approach which foster an enhanced environment of efficiency and productivity wherever they are applied. Within NM, the effectiveness of these transferable rules and norms are reflected in enhanced output – output which, in the business world, can easily be seen in increased production and increased profits. Consequently, in education, the comodification of learning as an indicator of production and efficiency is a requirement of the NM model – the 'effectiveness' of schools is reflected in the efficient production of learning.

Central to assessing the effectiveness of organisations is the 'audit culture' inherent in NM. For Elliott (2001, p. 201), audit is a form of:

> …managerially orchestrated self-inspection…[which] is indicative of an organisation which has moved into a state of continuous doubt about the trustworthiness of those engaged in its core activities.

Audit in NM supports the legitimacy of the commodities of 'knowledge' and 'learning' and is a tool which mediates assessment of the effectiveness of schools, and teachers, in the production of these commodities (Elliott, 2001, p. 204). An audit culture seeks to ensure reliability, consistency and efficiency in production - audit demonstrates that these objects have been attained, and in doing so quantatise the product i.e. 'education'. To be able to measure such output, data and statistics underpin NM:

> Social and metal process suddenly become objectified in numbers, through the appliance of scientific testing, and arranged in league-tables, or 'market-stalls', awaiting the gaze of the consumer, the parent, who will 'chose' a school. These 'hard' facts are re-worked aesthetically into the marketing icons of the glossy brochure or the designer web-site, tempting customers. (Hartley, 1997, p. 141)

The productivity and efficiency central to NM, and the associated centrality of audit and data, is supported by what Foucault (1980, p. 104) calls 'normalisation'. Normalisation is integral to such state apparatuses as 'medicine, law and education' (Kenway, 1990, p. 175) and is the processes through which ideas and actions become 'natural' within an organisation.

Normalisation is also central to Foucault's notion of 'disciplinary power' (Jones, 1990, p. 96). Disciplinary power involves the construction of rules and norms of conduct where individuals are rewarded, or punished, for conforming to or deviating from these norms. Foucault positions normalisation as a tactic for exerting the maximum organisational control with the minimum input of resources. This increase in the efficiency of control locates normalisation as part of a 'compliance culture' which 'stresses normalisation and standardisation and punishes deviance' (Shore & Roberts, 1995, p. 14) - normalisation, and with it disciplinary power, underpins the constituent conditions for NM.

Within a normalised model of NM, the non-regulated skills of those working within the organisation become removed - there is a process of 'deskilling' within the market led drive for production, as Tipton (1988, p. 15) writes, the imperative has been for:

> …the continual reformulation of jobs, whether blue collar or white collar, so as to separate the principle of conception from execution. The system strives to reduce workers' jobs to pure execution, the essence of the labour process, over which management has complete control.

Deskilling results in 'less autonomy for workers' (Apple, 1996, p. 85) and in an educational context is a process where, through constant external audit, teachers ultimately begin to distrust their own expertise:

> …teachers' work is described as intensifying under stable or deteriorating conditions and interventionist styles of management. The consequences are predictably uniform: Teachers distrust their expertise, rely on others, and become de-skilled. (Valli & Buese, 2007, p. 524)

New managerialism can be seen as both a technology of production and efficiency, whilst also mediating conditions of audit and normalisation. These abstract technologies are supported by the mediation of computer technologies in the storage and analysis of the data used for audit. Technology both mediates the culture of NM in education, whilst also mediating the 'professional' and performative structures indicative of successive UK government's approaches not only to education, but to management of the wider public sector.

Professionalism

New managerialism, and the climate of performativity in schools, has had the effect of increasing teachers' workload, working hours and stress (Bartlett, 2004, p. 578). Moreover,

NM not only redefined education and learning as commodities, and also redefined the conditions of teachers as 'professionals' – there was an acquiescence where teachers were forced to sacrifice basic values to attain a 'misrecognised' style of professionalism (Jeffery & Woods, 1998, p. 26). The management of schools as corporations, of teachers being positioned as technicians, and of educational technology emphasising an increased level of efficiency and professionalism, reflected the – albeit slow - 'mechanization of teaching' (Cuban, 1986, p. 90). This notion of the link between the technology and professionalism is demonstrated in the relationship between technology and the:

> …reformations of teaching and the 'new lives of teachers' – not least notions of professionalism, collegiality and 'effectiveness'. (Selwyn, 2010b, p. 120)

The relationship between technology and professionalism reflects technology as not only mediating teachers' activities, but of symbolising their professionalism. Technology mediated, and represented, a new, modern and progressive educational system. However, the notion of professionalism is itself contested (Hargreaves, 2000, p. 152), particularly as Lawn (1996, p. 120) indicates, it is both 'situational and relational'. Professionalism has differing contextual meanings, and is assessed according to differing criteria:

> …[professionalism] measured teachers against the established professions using such criteria as salary, status and knowledge base. Pronouncements were then made as to whether teaching was a 'real' profession, or a semi-profession. (Smyth, *et al*., 2000, p. 44)

The underpinning reason for the Labour Government fostering a climate of teachers' professionalism was that of 'control' (Goodson & Hargreaves, 1996, p. 4) which developed from the state's objective of restricting what Lawn (1996, p. 120) suggests were teachers growing 'working-class alliances'. Professionalism was linked not to an increased emphasis on the opinions and experiences of teachers, but instead on an increased control of teachers. Central to these conditions of control were the consequences of such conditions - in addition to technology mediating the increased production in the free market it also 'professionalised', and to a certain extent, controlled, teachers.

Technological mediation increased the production of the performance measures against which teachers were assessed. The free market, NM, professionalism, and technology, led to teachers finding themselves working under much tighter working conditions underpinned by control

(Hargreaves, 2000, p. 153). Hargreaves' suggestion is supported by Smyth *et al* (2000, p. 45), who suggest that part of this control culture was that teachers increasingly had their 'output' closely regulated. The control and regulation of teachers output (and their practice) was reflected in the audit-culture intrinsic in the NM approach to public service management (Strathern, 2000, p. 38). As Sachs (2003, p. 6) indicates, such a standards regime provides the regulatory framework for governmental control, control which as Goodson and Hargreaves (1996, p. 5) maintain, is a consequence of a wider remit of school 'improvement' and performance management.

The tensions between the demands of performance, the implications of the technologisation of teaching and teachers, and teachers' personal beliefs, resulted in what Ball (2003, p. 221) characterises as 'values schizophrenia' through a climate of enforced professionalism. The rise of the free market and professionalism in education, the position of technology in mediating these, and the eradication of teachers' value, are reflected in teachers 'making do' under these conditions:

> "Making do", coping with new technical demands and the resulting tensions which emerge are just some of the things that occur...particularly as in the current conjecture, this is part of a much larger process of cultural change. (Goodson, *et al*., 2002, p. 104)

Performativity

Integral to values schizophrenia, is that teachers experience shame through 'playing the game of performativity' (Ball, 2003, p. 222). As Jean Francois Lyotard (1979, p. 47) writes, performativity is the 'legitimation' of that which contributes to maximising optimal performance of a system. Performativity underpins NM and as such, was part of the drive for high standards increasingly prevalent in technologically mediated educational models (Conlon, 2000, p. 112). According to Warschauer *et al* (2004, p. 574), in a performative system, measurable performance becomes a 'justifiable end' in itself and results in teachers:

> …going through the motions of ticking off a checklist of skills rather than paying attention to the larger issue of knowledge construction and purposeful learning. (Warschauer, *et al.*, 2004, pp. 574-576)

Performativity also reflects models of performance management borrowed from commercial situations (Ball, 1998, p. 190). For Fisher (2007, p. 525), performativity was applied to schools

(and other public sector organisations) in a manner 'previously confined to manufacturing' - an assertion which resonates with the discussion earlier in the chapter regarding NM. Ball (2003, p. 216) is clear in his analysis of performativity – it is a technology which mediates accountability, performance, regulation, judgment, control, reward, and sanction. Accountability in performativity reflects a culture of applying 'quality management to professional activity in the public sector' (Crook, *et al*., 2006, p. 95) – performativity entwines technology with knowledge, learning, and progress through the maximisation of output and the minimisation of input.

Rather than performativity solely focussing on inputs and outputs, Ball suggests (1998, p. 195) it can also be seen in terms of 'valued, and valueless, activities' - performativity not only assesses what is of value, performativity is the mechanism by which those activities are identified. Consequently, performativity is a performance management regime aimed at professionalism, control and leading to a constant 'process of modernization' (Mahony & Hextall, 2001a, p. 133); such performative control had a defined set of criteria:

> English schools…must sharply focus their efforts as never before on the management of teacher performance in order to improve measured pupil performance. There are three direct connections: first teachers' central focus is pupils' (test and examination) performance. Second, head teachers must focus on the management, deployment and development of teacher performance in order to enhance pupil performance. And third, governors must set targets for pupils' performance based on prior attainment data and national attainment targets. (Husbands, 2001, p. 11)

Moreover, performativity has replaced an educational discourse of liberal humanism, with one positioning teachers as technicians rather than 'reflective professionals' (Whitty, 2001, p. 163). This performance culture has implications for the ways in which teachers view their work – particularly if they feel what they do is not 'valued within the metrics of accountability' (Ball, 2003, p. 223). Such a culture has an effect which, as Ball (2003, p. 223) suggests, 'engenders cynicism' which is counter-productive - because performativity focuses on technology mediating production and efficiency this can undermine the conditions which underpin successful organisations:

> Even in an era increasingly dominated by technology, what differentiates effective and ineffective organisations are the quality and commitment of the people who work there. (Bush & Middlewood, 1997, p. viii)

Consequently, there is an importance for organisations not to forgo people for technology – as illustrated in the difficulties of technological systems such as NGfL:

> Such a system enables regiments of functionaries to check on student after student against criteria from which efficiency measures can be calculated and compared in the name of performativity. The NGfL is perfectly adapted to the lock-step of standards-based instruction, where "delivering lesson content" becomes a pretext and a context for administrations to demonstrate fiscal accountability by showing how standards get met with ever increasing "efficiency". This involves a profound alienation of learning – a turning away of learning from authentic engagement with the world in ways which actualize human powers. Instead learning becomes a process of wearing a path through regular and regulated points in a grid. Learning literally becomes gridlocked to the extent that teachers and learners do not actively resist alienating tendencies built into education when it is constituted as a site of performativity. (Goodson, *et al*., 2002, p. 118)

The concern with a technological system such as NGfL - and its role in mediating performativity - was that the completion of technological tasks became an end in themselves (Warschauer, *et al*., 2004, p. 576). As Hodas (1996, p. 204) illustrates, NGfL highlighted a tension between schools as technologies of production, schools as technologies of learning, and technology mediating schools to be 'more or less efficient in their operation'. However, such a wholesale commitment to efficiency of technological production in education has its own consequences due to the complexity and subjective nature of educational systems (Hodas, 1996, p. 205). The challenge that faced schools and teachers as part of a technology mediated, performative education model was responding to the multifaceted nature of assessing the processes of learning and teaching, and how technology mediated that process (Rudd, 2001, p. 219).

The difficulties of assessing the relationship between technology and learning is reflected in 'fabrications' (Ball, 2001, p. 211). In a performative culture, organisations represent themselves through fabrications reflecting measures of accountability which are:

> …versions of an organisation (or person) which does not exist – they are not 'outside the truth' but neither do they render simply true or direct accounts – they are produced purposefully in order to be 'accountable'. Truthfulness is not the point – the point is their effectiveness, both in the market and for inspection or appraisal, and in the 'work' they do 'on' and 'in' the organisation – their transformational and disciplinary impact. (Ball, 2003, p. 224)

Consequently, in a climate of performativity and fabrication, schools and teachers are transformed into an auditable commodity (Shore & Wright, 1999, p. 570). For Ball (2003, p.

225), a crucial part of this climate of audibility is that fabrications become 'embedded and reproduced' by the systems which report on teachers' practice. Technology has a central part in mediating performative assessments of practice. For example, the BECTA document *Improve your School* (2009a) states that educational technology helps to 'benchmark' schools against one another – in this model schools use technology, such as league tables, to meditate the positioning of themselves against other school not as colleagues but as competitors. Underpinning fabrications is that teachers are expected to evidence 'best practice' and constant improvement (Ball, 2003, p. 225).

In such an environment, 'schemes for accountability' (Lortie, 1975, p. 128) play an important part in justifying teachers' success in attaining, or failing to attain, such improvement. Such accountability became a substitute for trust with teachers feeling that trust in them was being diminished (Jeffery & Woods, 1998, p. 98). The relationship between technology, performance and trust can be seen in instruments of performativity where technology and performance management are:

> …not simply instruments but a frame in which questions of who we are or what we would like to be emerge. (Dean, 1995, p. 581)

Trust in technology appears to be held in greater esteem than trust in a person (Hodas, 1996, p. 204) – consequently, technology becomes inherently trustworthy and unquestioned. Such a reliance on technology to represent the trustworthiness of teachers and schools can be seen in both technocratic education policies, and a fixation on performativity, as Goodson *et al* (2002, p. 128) suggest, 'to shape and regulate' the use of technology in classrooms. That technology is seen as both trustworthy, and as a tool which 'reinforces reality' (Lyotard, 1979, p. 7), these assumptions have fundamental implications when examining why teachers use technology the way they do. In a performative culture, where teachers' performance is measured in terms of measurable outputs such as examinations, technology has a multifaceted meditational role in this process. First, technology is assumed to inevitably mediate increases in the production of these outputs. Second, technology mediates the production of evidence to qualify the levels of these outputs. Third, technology mediates the assessment of teachers' effectiveness at producing these outputs. Consequently, technology not only mediates such a culture, it

sustains performativity by reinforcing fabrications, increasing measures of accountability, and imposing new levels of teacher control.

2.3 Technology, identity and community

My final research question asks, "What are the consequences of using educational technology". In exploring this question, I focus on two factors. First, I examine the relationships between technology and teachers' 'educational identities' (Moore *et. al*., 2002, p. 551). Second, I explore how educational technology mediates changes in teachers' informal communities of 'camaraderie and communitas' (Woods, 1995, p. 93), and how the technological mediation of these communities can lead to what Troman (2000, p. 344) describes as teachers 'isolationism'.

Teachers are constructing their educational, pedagogical and professional identities during a time of socio-economic and technological change (Moore, *et al.*, 2002, p. 551). Technology mediates changes in the environment in which teachers work, whilst also being changed by that environment, and gives rise to explicit challenges to teachers' professional identities (DaPonte, *et al*., 2002, p. 96). This is reflected in change which, as Cloke and Sharif (2001, p. 9) suggest, is both pedagogical in the sense of teachers 'behaviours', and personal, in the sense of what teachers recognise as their identity. Goos (2005, p. 49) describes this identity as both 'personal and professional' – teachers identify with their professional selves impacts upon, and is impacted by, their private selves as the two are interlinked.

Part of the development of teachers' professional identities is how technology is positioned contextually and institutionally as both tool and norm:

> The development of a professional identity involves assumption of the essential norms and values of a profession. Also related to a strong professional identity is an attitude of commitment to self-improvement as an educator and willingness to contribute towards the development of the educational institutions where one works. (DaPonte, *et al.*, 2002, p. 96)

The assumption of the values and norms of what it is to be a teacher is a central part of teacher identity. Despite the work of authors such as DaPonte *et al*, there has been comparatively little research regarding technology and teacher identities (see for example, Alsup, 2006; Parker & Neuenschwander, 2000). However, Goos (2005, p. 35) conducted a

case study which identified the relationships between a range of personal and contextual factors, including technology and the development of teacher identity. Technology can be seen as an important pedagogical resource for teachers, and having a role in mediating what Goos (2005, p. 49) calls teacher's 'emerging identity'. In such an identity, technology is not an auxiliary tool but rather an essential element that mediates the process of teaching and influences teachers' practice (DaPonte*, et al*., 2002, p. 113).

Professional identity is an aspect of teachers' 'working environments' (Berger & Luckman, 1966, p. 16) and is underpinned by 'private theories' (Senge, 1990, p. 17) which influence how they make decisions and take actions. Teachers' beliefs, social dynamics and the culture in which they work, are also part of what forms professional identities (Windschitl & Sahl 2002, p. 165). As Churchill (2006, p. 571) claims, these identities emerge from *both* 'individual beliefs and institutional influences'. Technology will be a part of what mediates those professional identities – identities formed with regard to how technology is positioned within an institution, and teachers' own beliefs as to what activities technology can, and cannot, mediate.

The connection between teacher identity, personal beliefs, and institutional context is reflected in the multi-levelled construction of identity. As well as private theories, teachers draw on what Convery (1999, p. 131) presents as different 'traditions'. These traditions are part of an 'active location in social space' (Coldron & Smith, 1999, p. 711) - technology sits within identity forming traditions as a part of teachers' personal learning experiences, their cultural and social location, and the influences of other teachers. Social space is attained though relationships with others, social structures, as well as a creation of the individual. A consequence of both traditions and social space on teachers' identity is that limits and boundaries – as defined through for example governmental policy – have an impact on not only what teachers do, but also the formation of their professional identity:

> …policies that impose greater degrees of uniformity and conformity threaten to impoverish the notion of active location, restricting the number of potential positions teachers might assume. (Coldron & Smith, 1999, p. 711)

Teachers respond to external influences (such as political intervention, educational policies, or the imposition of new technology) on their professional identities by employing different strategies. For example, a teacher might tend toward 'principled pragmatism' at one polar end

of a continuum or 'contingent pragmatism' at the other (Coldron & Smith, 1999, p. 711). Teachers adopting a principled pragmatism react to external influences by presenting themselves as the decision maker with agency over these influences - in this case, the advent of new technology mediates an active assimilation and 'mastering' of the new tools. Contingent pragmatists however, demonstrate overtly and uncomfortably their enforced adjustment (Moore, *et al*., 2002, p. 554) – for these teachers, technology is a tool which has been thrust upon them and which they are expected to accommodate by changing their practice.

Teachers who are forced into realigning their professional identities through external influences experience a conflict between global influences and 'personal dispositions' (Giddens, 1991, p. 5). With regard to technology, such influences might be overwhelmingly technocentric despite teachers' personal dispositions challenging such a view. This conflict between external global influences and teachers' personal dispositions, leads not necessarily to a resolution of the conflict but an 'identity crisis' (Moore, *et al*., 2002, p. 554). Teachers' identities are being reformed on one hand by external influences, and on the other, by the realisation that the:

> …the transformation of the educational domain is not achieved by simply introducing new cultural tools. (Deaney, *et al*., 2006, p. 478)

Teachers demonstrating contingent pragmatism toward their professional identity are reacting to what Huberman (1983, p. 478) positions as the 'classroom press'. For such teachers, contingent pragmatism is about being able to survive what appears a never-ending onslaught of new initiatives, systems, processes and technology. Teachers who unwillingly experience a reorientation of their professional identities through the enforced introduction of unwanted technology, curriculum, or policy turn to different coping strategies (Woods, 1985, p. 13). A potential consequence of these coping strategies is that, rather than challenge external influences, teachers embrace an unwilling assimilation which leads them to become:

> Far less openly and actively oppositional to unliked public educational policy – far less 'political' as some teachers put it – and that there may be a corresponding guilt and denial on many teachers part as they are obliged to put some policies into practice at the local level. (Moore, *et al*., 2002, p. 562)

This unwilling assimilation of policies which challenge teachers' identities and the corresponding rejection of active opposition has resulted in teachers' identities being

reorientated (McLaren, 1986, p. 87). The reorientation of teacher identities in can be seen in terms of what Ball (1999, p. 7) calls the 'reformed teacher' who has attempted to take ownership of their own professional identity by willing by assimilating reform; or the 'authentic teacher' (*ibid*) who absorbs reform but not the ideology which underpins it and thus retains their own pedagogical and philosophical identity. Teachers are not exclusively reformed or authentic, as there may be occasions when a teacher assumes the identity of the reformed teacher, and other occasions when the authentic identity is assumed. Educational technology is perhaps a prime example of mediating this movement from the reformed to the authentic where part of the reorientation of teachers' identities are the 'practical theories' (Deaney *et al.*, 2006, p. 459) teachers employed in order to incorporate educational technology into their pedagogy:

> A practical theory [is] a form of orientating statement concerning how technology is seen as supporting learning and guiding the development of pedagogical strategy incorporating its classroom use. (Deaney, *et al.*, 2006, p. 463)

As Deaney *et al* (2006, p. 476) continue, an example of such practical theories can be seen in the additional management issues teachers might face due to having to patrol students' use of Internet connected PCs, as well as address the unreliability of computer systems and lack of technical support. Technology mediating teachers' activities is reflected in teachers not only employing practical theories relating to the use of technology, but also having to reconsider their overarching teaching identity. Teachers are having to both mediate a learning environment whilst also being a computer technician; the end result being a modification of pedagogy (Deaney, *et al.*, 2006, p. 478). Consequently, technology mediating changes in teachers' identities and theories of practice involves not only teachers thinking about what it is to teach, but also what their role is as a teacher, and the physical look and emotional feel of the classrooms in which they work (Kerr, 1991, p, 132).

Community

As I discussed in the second section of the literature review, in developing models of teachers' professional identities, personal beliefs - such as those relating to the worth of educational technology – are assimilated with the social dynamics and culture of the institution in which

they work (Windschitl & Sahl, 2002, p. 165). In schools, social dynamics and culture can be seen as part of the communities to which teachers belong. Authors examining teachers' communities range from Dewey's *The School and Society* (Furman, 2002, p. 5), to the 'Balkanization' (Hargreaves, 1994a, p. 212) of teaching. However, the use of the word community in an educational setting is contested - Westheimer for example, is critical of the 'many underspecified uses of the word community' (1998, p. 1). Consequently, community needs to be carefully defined. Community might reflect 'communitas' (Jeffery & Woods, 1998, p. 146) where teachers' share a common destiny and camaraderie; it might refer to individuals, groups, or both:

> …who share the same general objects, and are defined by their divisions of labour and shared norms and expectations. (Barab, *et al*., 2002, p. 78)

Community might be supported by the rules which define the different roles for its members (Worthen & Berry, 2006, p. 126); community might also consist of those who are directly or indirectly involved in tasks (Engeström, 1987a, p. 303). Community might describe supportive learning environments:

> …where teachers may collaborate and engage in dialogue with colleagues and other professionals. (Snow-Gerono, 2005, p. 241)

As Hargreaves (1994b, p. 231) illustrates, community might simply consist of teachers who are 'really good at supporting each other'. However, in educational terms, community has increasingly come to reflect schools as a formal organisation where such formal (as opposed to informal) communities:

> …direct attention to incentives, management structures, oversight and accountability, governance, technology, and material aspects of the workplace. (McLaughlin, 1993, p. 99)

This industrialised, and technology mediated, use of community, and the resulting challenge to communitas through the rise of 'corporate identity' (Ball, 2003, p. 219), could be seen in what Achinstein (2002, p. 6) calls the 'metaphor of community'. The metaphor of community challenges teachers' assuming a (potentially imposed) corporate identity – in doing so, it also supports an examination of technology in community. The metaphor of community positions technology as a tool which whilst ostensibly mediating new formal communities, can also destabilise, reconfigure and undermine existing informal ones. Rather than technology

necessarily being a tool which strengthened teachers' communities through initiatives such as NGfL (see for example, Selwyn & Fitz, 2001 p. 127), technology was part of a Governmental drive toward a formally organised, and industrially based, version of teachers' communities. Community became a metaphor for professionalism and mediated by technology.

Teachers' communities suffered from a 'soulless standardization' (Hargreaves, 2003, p. 49) resulting from recent educational policy and performance driven school systems – particularly with regard to how technology mediates the community of the classroom, student and teacher:

> Classrooms are steeped in emotions. In the fervent quest for precise rationality and technical efficiency, introducing to each classroom enough computers to tutor and drill children can dry up that emotional life, resulting in withered and uncertain relationships. Students working with computers alone or in pairs for long periods of time lose time for direct and sustained contact with teachers. Binds develop instead between students and machines. Information comes from the machine; the machine generates praise and nudges the student along programmed paths constructed to guide the user to further learning. Adult child ties may unravel as a consequence of the newly developed child-machine liaison. (Cuban, 1986, p. 89)

Central is that community can be based on professional relationships – it can be underpinned by a corporate commitment to production, efficiency and output. However, community can also be based on the emotional and ephemeral 'in it together' spirit of communitas which highlight the importance of:

> …collegiality and collaboration [where] teachers are enthusiastic about their work and the focus is on devising strategies that enable all students to prosper. (McLaughlin, 1993, p. 94)

Consequently, the focus of teachers' communitas is based on shared values and a commitment to social justice and learning for both teachers and students. Such shared values can be seen as the 'good' features often associated with community – along with membership and belonging - and that such attractive features establish community as containing the socially advantageous features of trust, loyalty and mutual attachment (Strike, 2000, p. 617). It is important to consider not only a solely community-centric view – there are potential 'bads' of community, such as sectarianism that can 'erode such public goods as tolerance or citizenship' (Strike, 2000, p. 618). When considering community it is important not to position it as being

inevitably beneficial and supportive – having said that, in the most successful models the negatives of community are outweighed by the positives (Strike, 2000, p. 639).

However, in both these polar ends of the community continuum, the assumption is that participation in community is voluntary. When participation in community is fabricated, enforced and involuntary then the effects tend toward the detrimental. For Huberman (1983, p. 13), an imposed professional community is both naïve, and not a positive experience:

> …the lure of a common mission enacted by a family of like-minded adults – of professional work planned, observed, and carried out in concert – can be a hazardous one…it allows some people to interpret the professional practice of others in moral terms rather than technical terms…[and] it may not square with the actual conditions, limitations, and perversities of school life…by obliging people to subscribe to commitments they may not have or may feel unable to meet under normal working conditions, we run the risk of creating more defensiveness and vulnerability among staff, all in perpetuating most of the same instructional practices.

A consequence of a community being imposed on teachers is reflected in 'isolationism' (Troman, 2000, p. 335). Isolationism stems in part from the rise of the new corporate identity (Ball, 2003, p. 219) I discussed earlier, and an 'us and them' tension between managers and teachers (Troman, 2000, p. 332). Teachers' isolation is not necessarily from lack of community in a professional, corporate and contrived sense, more with regard to teachers becoming socially isolated from their colleagues and what Troman (2000, p. 344) describes as 'positive social relationships'. Isolated practice is regarded by most educators, administrators and policymakers as an 'inadequate way of performing teachers' work' (DeLima, 2003, p. 197). Indeed, the concerns regarding a culture of teacher isolationism is reflected in Younie's (2006, p. 399) research identifying the benefits of 'strong supportive teaching communities'. Crucially, technology is not inevitably successful in mediating such communities:

> At a deep level that often goes unspoken, I believe that many teachers may sense how the introduction of machines into classrooms endangers those intangible, highly prized rewards that count so heavily in why teachers decide to endure in a most difficult but intensely satisfying job. (Cuban, 1986, p. 90)

The 'mechanization' (Cuban, 1986, p. 90) of education and of teachers, has impacted on teachers' communities, teachers' isolation by the demands of technology and performance, and a reorientation of teacher and student relationships. Technology and teachers' isolation resonates with the wider issues of teachers becoming technicians and producers' where:

> ...teachers are treated and developed not as high skill, high capacity knowledge workers, but as compliant and closely monitored producers of standardized performances...Teachers with over examined professional lives complain of eroded autonomy, lost creativity, restricted flexibility and constrained capacity to exercise their professional judgement. (Hargreaves 2002, p. 6)

Whilst for Cuban (1986, p. 90) there is much in schools and classrooms which 'appear mechanical, such as lesson plans, rows of desks, worksheets and textbook assignments', these tools and practices do not necessarily themselves constitute the core *learning* experiences of classroom life. The position of technology in mediating condition which lead to the undermining of informal teacher communities and fostering formal (and contrived) ones is not only reflected in teachers' isolation - there is a need to return to teaching about values, social justice and caring:

> Teaching beyond the knowledge society therefore means serving as a courageous counterpoint for it in order to foster the values of community, democracy, humanitarianism, and cosmopolitan identity. Without these, there is little hope of sustained security for any of us. (Hargreaves, 2003, p. 59)

Consequently, the opposite ends of the continuum of technological mediation need to be examined against each other – at one end technology might mediate improved and enhanced levels of communication between teachers and parents, at the other, the consequences of such communication might mean that students are able to text each other during lessons rather than concentrate on the lesson itself. The increasingly technologically mediated and mechanised version of teaching and teachers has consequences not only for what teachers do, but how teachers experience the institutions and communities of which they are a part.

2.4 Summary of key themes chapter 2

The literature I have reviewed in this chapter has enabled me to develop an understanding of different views on the connections between educational technology, pedagogy, society and community. The review also helped me to consolidate my position that to understand the technology mediating teachers' activities, it is both relevant and pressing to examine teachers' experiences of using technology. In framing the literature review within my research questions, I have been able to focus my analysis of the literature on three specific landscapes.

First, I discussed literature relating to technology and teachers' actual practice. To do this, I examined the relationships between technology and teachers' beliefs. I discussed how teachers' beliefs, and their experiences of technology, were part of a potential pedagogical realignment, which might lead to teachers embracing technology into their practice, or continuing to treat it with pedagogical caution. Second, I explored SST through the reciprocal, as opposed to one-way, relationship between society and technology. I then discussed (and challenged) the technologically deterministic assumption that educational technology is neutral or itself a change agent, the impact of a free market globalised model of education, NM and performativity in such an educational climate of attainment, production and improvement. Finally, I analysed literature on the relationships between technology and teachers' educational identities. I explored how educational technology mediated teachers' formal and informal communities, and how the technological mediation of these communities might lead to teachers' isolationism.

This chapter has located the project in the literature whilst also focussing some of the specifics of educational technology with which I am concerned. Although the chapter is presented in linear form this does not reflect the iterative process of the review. The consequences of technological mediation are affected by the reasons technology is used - I am not suggesting delineation between the three areas of the review within teachers' experiences. As much as technology is socially shaped, so too are the three landscapes examined in this chapter interrelated with one another, and the political, cultural and social context of which they are part.

Chapter 3: Design and methodology

Synopsis of Chapter 3

I begin this chapter by writing 'narrative portraits' (Stronach & MacLure, 1997, p. 34) of the two key informants - Nicola Howard and David Sharma (both the names of the teachers and the school are pseudonyms). These portraits establish some context to these teachers, and to perhaps reveal some of the events and influences, which shape how they experience educational technology. Similarly, I describe Brampton High as the school in which the research is set, and Hither Vale as the area the school serves, to offer 'thisness' (Thomson, 2002, p. 73) to the research setting.

I discuss the design, methodologies and analysis I have used. I explore my positioning the study with a sociocultural theoretical framework. I situate the research design as both qualitative and ethnographic. I discuss ethnography, and consider the implications of conducting ethnographic research. I focus particularly on the need for the ethnographic researcher to experience for themselves the research context whilst not losing sight of the purpose of the research. In doing so, I establish reflexivity in the project.

I examine the methodologies I have used for data generation, particularly participant observation and interview. I discus the processes for gaining access to the school and constructing the sample. I develop the claims that I make for data, and discuss reliability, validity and trustworthiness. I discuss my analytical model which has two 'stages' - I discuss my use of a 'grounded theory' (Glaser & Strauss, 1967) coding of contextual data, leading to my 'activity theory' systems analysis. I write a brief chronological background of activity theory from its roots in the work of Vygotsky and Leontiev to the 'second generation' (Engeström, 1987b) model used here. I then establish the process I used for my analysis, and describe how I synthesised my analysis to suggest similarities in teachers' experiences of technology.

3.1 The research context

Before beginning my discussion of the two key informants, area and school, it is important to be clear about the two objectives of this opening section of this chapter. First, I have gone into some detail writing the Nicola and David's biographies in an attempt to develop 'narrative portraits' (Stronach & MacLure, 1997, p. 34). Through using the narrative portrait model, rather than positioning these two teachers only within their work context, I examine some of the experiences, influences and people who have helped form these teachers' personal and professional identities. This examination of the narratives of these teachers revealed an insight into why they might experience educational technology as they do. I have tried to make the narrative portraits (as much as I can) a representation of the teachers as I experienced them. However, these descriptions are no more than a brief introduction to Nicola and David at a specific point in time.

Second, I have also gone into detail describing the school in which the project is set, and the area the school serves. I have done this in an attempt to convey the 'thisness' of the school:

> In order to understand thisness, it is necessary to think of the school as a particular material place. Each school 'place' is a distinctive blend of people, happenings, resources, issues, narratives, truths, knowledges and networks, in and through which are the combined effects of power-saturated geographies and histories are made manifest. (Thomson, 2002, p. 73)

To examine how teachers experience educational technology in a school it is imperative to give a sense of thisness and context to that school. Without considering both the school and its location, an important part of the social and cultural context would be missed.

Finally, it is relevant to discuss two issues of housekeeping. Throughout this section documents which could compromise the anonymity of the school, have been cited but not referenced - for example OfSTED reports. Similarly, and to maintain anonymity, the teachers, school and its location have been given pseudonyms.

Nicola Howard

Nicola Howard has taught at Brampton High for three years; she was born in Hither Vale and has lived most of her life there. Nicola attended University in her home City of Anchester and it was only as a result of getting her first teaching post in a different part of the country that she

briefly left the area. That Nicola was born in Hither Vale, and experienced her own primary and secondary education in the area, gives richness to her experience as a teacher at Brampton. Indeed, the primary school Nicola attended as a pupil is a feeder school for Brampton.

Nicola is a 35 years old DT specialist and Year Learning Leader (YLL) of year 9 – YLL is the term used for Head of Year at Brampton. Nicola had what she described as a "terrible education" and left school at sixteen with poor examination results and went to work at a local shop. Through her interest in playing and teaching music, she became convinced that she could move on both intellectually and emotionally from her present setting. Although it was her love of music which focused her teaching abilities, Nicola always had an interest in design, art and technology – consequently, she entered into a process of access courses and night school examinations until she was accepted to attend university as a mature student. Nicola graduated with a BSc in computer science and went to work in the automotive industry. However, she soon became frustrated at the rigidity of her work and took a Post Graduate Certificate in Education (PGCE) to become a teacher.

Nicola was divorced in 2009. She has two daughters and they live together in a Victorian town house in Hither Vale. Nicola bought this house when she first started working and when house prices in the area were comparatively low. Nicola as a resident and teacher in Hither Vale is concerned about the area particularly in relation to crime and drugs. She has a busy social life outside of school. For example, Nicola sings in a jazz band and enjoys social networking with her colleagues. Nicola is a Labour party activist, and National Union of Teachers (NUT) representative. This is an important point. Not that she is a member of a trade union or the Labour party, but that she is an active member of any trade union or political party. Brampton appears to be a-political - unions are accepted in the school but have a low profile. There are no regular union meetings and teachers do not appear to discuss politics openly, and certainly not union membership (although this is not necessarily different from other schools). In cases of dispute, union members tend to be represented by colleagues from other schools. Nicola suggests that a majority of teachers join unions not because of any trade unionist ideals, but for representation in case of disciplinary or legal action against them. She is particularly critical of the Labour party and the Coalition Government's educational policies, those of testing,

league tables, free-schools and the focus on justification of investment through performance and results.

Nicola is involved in many of Brampton's professional and social events. For example, she has been a part of the KS3 curriculum working party and runs both the Duke of Edinburgh Award scheme at Brampton as well as organise staff social events. When I have observed Nicola in her activities it is apparent that the demands on her time are severe; despite this I would describe her as approachable and willing to find time to help others. Nicola uses her TPC for a range of activities. For example, she uses predictive software such as the Centre for Evaluation and Monitoring (CEM) Middle Years Information System (Midyis) and Year Eleven Information System (Yellis). Nicola also uses Fisher Family Trust (FFT) data for predicting the transition from students' KS3 grades into KS4 examination results. Nicola uses the school's intranet system (e-portal) to access data regarding absences, examination grades, predicted grades, Social Services, and Special Educational Needs (SEN) provision. She has DT specific software (such as Microsoft Visio) installed on her machine. Both Nicola and David use social networking sites such as Facebook to contact staff and students as well as making use of pod casts, emails, You-tube and Twitter.

If I were to reflect on my experiences of meeting, observing and interviewing Nicola I would describe her as an 'über-professional'; that is, a teacher who appears to be in control of most, if not all, of the demands of her role. Nicola is smartly dressed at work, where she wears a suit - she claims it is important for her to look smart and that her clothes are part of being professional as well as a mark of the respect she has for her job. Nicola says she is passionate about being a teacher. A colleague I spoke to characterised her as "wearing her heart on her sleeve" - sometimes too passionate. Nicola, although softly spoken, can have a towering presence in the school. She is a teacher who can project her voice and use subtle changes in intonation to make a point. In Nicola's pastoral role she is both approachable whilst having clearly marked boundaries with rewards and consequences underpinning these boundaries.

David Sharma

David Sharma is 49 years old and has taught at Brampton High for twelve years. Before taking his current Assistant Principal (AP) role on the Senior Leadership Team (SLT) he was head of

the Science faculty for eight years. Previous to this he taught for three years at a large secondary school where he was second in the Science department. David's first post was for two years. David started his career as a chemist working in a range of pharmaceutical companies. After becoming frustrated at the lack of promotion opportunities, and interaction with other people, he retrained to become a teacher.

David enjoys the 'banter' associated with men, he enjoys going to the pub with groups of male friends and he enjoys portraying an image of an 'action man'. Stronach and McClure (1997, p. 41) describe such a male teacher as one who is comfortable with the physical knocks of a sportsman, discussing cars, being a 'bloke'. One teacher described David as "larger than life". David pretends to be careful with his money, dismissive of frivolities such as fashion, proud of his association with the armed forces (he was a member of the Territorial Army for many years). David likes talking about sport and particularly discussing rugby league which is a 'proper man's sport'. He used to play cricket, football and rugby, although not anymore, and complains that his injuries are catching up with him. David owns and drives a 1970's Jaguar XJS and certain colleagues constantly tease him about the 'mid-life crisis' parked in his garage. Despite this action man image, David appears comfortable discussing his emotions with people he trusts. For example, David's wife suffered a horse riding accident and she has been in and out of hospital with a serious back injury. She has been unable to move and David has been put in a position of caring for her. This has impacted on his school duties, as he has had to take time off from work to do this. David has talked about the emotional strain this has had on him – he feels guilty that he is leaving school early to look after his wife, he feels scared that she will not recover from the accident.

David is very much the family man and is proud of his two daughters who are both at different universities. David met his wife when they were both members of the Territorial Army (TA) and he still has associations with his TA unit. For example, David participated in a classic car rally which raised money for the Help for Heroes charity. David is a member of the National Association of Schoolmasters Union of Women Teachers (NASUWT). I have not heard him discuss politics at school, and on social occasions he is similarly guarded; he is happy to talk

about politics on the periphery of a topic, but does not participate in openly political conversation. David likes to socialise with the Science faculty, and has close friendships with some colleagues. Although a member of SLT, David is one of only two senior leaders who go to school social events. David enjoys the pub, a game of pool or darts, and the opportunity to have a good talk about education. He lives in a 4 bedroom new build house in a country village and commutes the 10 miles each way to Brampton. David says that he is not ambitious, and is happy with his AP role, although he misses being a head of faculty.

David is a regular churchgoer and describes himself as a committed Christian. His place of worship is in the centre of the city in which Brampton High is located – there are churches in the village in which he lives, but he prefers the setting, and congregation, in his own church. David does not depict himself as wearing his religion on his sleeve; however he has told me that his faith is very important to him. If I were to describe David's manner in the school I would frame him as professional and involving, calm, confident and sensitive to the needs of others. David suggests that relationships are the most important part of his role as teacher and AP. From talking to other teachers, David appears to receive respect in return for his own working practices. I have observed David in many different situations; he uses the same tone of voice, he does not shout and has an empathy which appears to transmit to others.

When I have talked informally with teachers at Brampton about David he has been described as a 'maverick' amongst members of the SLT. He expresses his opinions on different matters even if his view is not that of the management team. For example, David does not dress the same as other members of SLT. He is certainly not scruffy and, as with Nicola, he wears a smart suit, however when I observed him at Brampton somehow his dress seems less corporate than that of other managers. For David, the way he chooses to dress at work reflects his position in the school, how he feels about himself, and how he hopes others experience him. David suggests that dressing smartly is a sign of professional respect for students and staff not an indicator of corporate identity.

I was conscious that David's participation should be as much on his terms as possible. I was particularly concerned that the project might turn into a chore, or duty, for David and that it

might cause him difficulties in his already hectic schedule (as well as his AP duties he teaches twelve hours of Science a week). On reflection, it was just this hectic schedule which was integral to David's experiences. It was as much David's continued involvement with teaching, as his role as a senior leader, which was part of his conversations about technology. As a teacher in the science faculty David has access to an assortment of technology. This includes PCs and TPCs and a range of science specific tools such as interactive data loggers, digital microscopes, chromatographs and spectroscopes. In his AP role he uses his office PC and TPC with Tracker, Midyis, Yellis, FFT and e-portal. There is a crossover in software applications between Nicola and David's needs, as both teachers make use of the statistical and predictive databases and the school's e-portal intranet.

Hither Vale

Hither Vale is located just to the north of Anchester's city centre and is where the majority of Brampton High students live. Brampton is the only secondary school in Hither Vale and it serves the areas young people from the ages of 11-18. I have used Office for National Statistics (ONS) data (accessed in January 2009) relating to 7,200 inhabitants of the Hither Vale Middle Layer Super Output Area (MSOA) in relation to crime, housing, employment and education.

In Hither Vale there are 6.5 thefts of motor vehicles per thousand inhabitants; the national figure is 2.9 per thousand inhabitants. There are 19.3 burglaries per thousand inhabitants; 4.3 is the national figure. The average price of a house in the UK in January 2009 is £220,000; in Hither Vale it is half that figure. The national figure for unemployment in England is 5.5%; in Hither Vale it is 8.8%. OfSTED (2007, no page) described Hither Vale as a 'multicultural area with high levels of social and economic deprivation'. When analysing these ONS statistics (and particularly when comparing Hither Vale to the national average) there appears to be a pattern of high crime, social and economic deprivation and high unemployment.

Hither Vale's housing predominantly consists of terraced houses. There are some large Edwardian town houses but almost all of these have been converted into flats and bed-sits. There are also Local Authority owned and housing association properties as well as low-rise

tower blocks. Close by Brampton there are empty and disused factories, and mills indicating Hither Vale's industrial past, small businesses, fast food outlets, and a children's activity centre which caters for the under-fives. Both of Hither Vale's Mosques are near to the school, as well as two churches, one of which is Greek orthodox, the other Polish orthodox.

The streets surrounding Brampton are mostly small, although there is a main road accessing the centre of Anchester in close proximity. Hither Vale is well served for public transport with buses and trams having several stops close to the school. There is only one public house close to Brampton High. A community swimming pool is attached to the school and located within the grounds of the KS3 centre. There is also a public library, central post-office and a range of counselling and help groups situated on the High street. There is a large public park, which houses an arboretum, AstroTurf football pitches and a playground. The far end of this space is adjacent to one of the City's red light areas.

	English Average	Hither Vale Average
Christian	71.14%	38.69%
Muslim	3.12%	6.71%
Sikh	0.67%	1.98%
Hindu	1.11%	0.94%
Jewish	0.52%	0.13%
Buddhist	0.28%	0.32%

Table 3.1 Religious observance of Hither Vale residents

Hither Vale has a wide and varied mix of religious observances and ethnicity. The streets immediately surrounding Brampton High are perhaps typical of Hither Vale - Table 3.1 and Table 3.2 (amended from ONS, 2001, 2009, no page) indicate data for Hither vale. However, the student population of Brampton High does not map neatly with these statistics. Whilst 70% of Hither Vale's population are white British this is not reflected in the population of the school:

> Around half of the students are white British; others are from a wide variety of minority ethnic heritages, the largest proportions of which are Pakistani, Indian and black Caribbean. (OfSTED, 2007, no page)

Those teachers I informally spoke with other than Nicola and David, suggested that these statistics paint an accurate picture of the area. Hither Vale is an area with high crime. It is an

area with problems associated with drugs, anti-social behaviour, unemployment and disaffection. The MSOA and OfSTED statistics suggest Hither Vale is an area which has a wide range of social and economic issues.

	English Average	Hither Vale Average
White British	86.99%	70.05%
White Irish	0.10%	1.90%
Mixed-Heritage	0.47%	3.52%
Black British	2.30%	6.40%
Pakistani	1.44%	6.13%
Indian	2.09%	3.10%
Chinese	0.88%	0.60%

Table 3.2 Ethnicity of Hither Vale residents.

Brampton High

Brampton High replaced Hill View School, which previously served Hither Vale. Hill View School had low GCSE A*-C passes (13% for the final YR11 cohort at Hill View), high exclusions and staff turnover. Hill View was a school described by OfSTED as failing the young people of Hither Vale. A consequence of this failure and ultimate closure of the school was demolishing Hill View and the building of Brampton High's Key Stage 3 (KS3) centre in 2006 on the Hill View site. Brampton is a split site school with 11-14 and 15-18 centres. What is now the 15-18 centre was the school's original building which housed all the students from year 7 to year 13. The original school was constructed on the site of an old factory in 1994. Both buildings have a modular approach to internal features - classrooms have partition walls between them which allow easy movement and relocation of teaching spaces and indeed whole faculties in relation to curriculum demands.

The 15-18 centre has a range of facilities with an emphasis on technology. For example, in 2009 a new theatre was built which was provided with digitally controlled sound and lighting systems. The school has a professionally equipped hair and beauty salon with twelve beds and digital hardware and software for hair colouring and other beauty treatments. Every faculty area has access to IWBs, LCDPs as well as PCs and TPCs, with relevant software and hardware

applicable to the faculties' area of focus. A study court is surrounded by the rest of the building which moves off this central feature. There are two floors which are accessed by numerous stairways. The corridors are carpeted and there are display boards with presentations of students work. There is a large sports hall used for physical education lessons on-site, as well as a purpose built off-site sports facility which is about a 15 minute walk away. Other than the central study court there is very little outside space and from my observations most of the students go off site for lunch breaks.

The 15-18 building has a mixture of mobile lap-safes containing TPCs and networked PCs such as in Image 3.1. Every classroom has a LCDP which can be wirelessly accessed, and there is a wireless cloud which covers the entire site which mediates wireless connection both inside and outside the building. There are Local Area Network (LAN) sockets which allow wired connection to the schools intranet. Plasma screen TV sets are located in study areas and the main cafeteria, with some set into corridor walls. These carry a mixture of public service broadcasts, for example highlighting room changes, examination locations and after school activities, along with messages relating to issues such as attendance, emotional health and bullying.

Image 3.1 15-18 Centre networked classroom and LCDP (circled)

The 11- 14 centre is a construction of floor to ceiling glass and stainless steel – see Image 3.2. The centre is on two levels with a central promenade running the length of the building. All of the classrooms at the 11-14 centre have a purpose built Lap-Safe, which is enclosed within the room's furniture; with the outer door closed the lap-safe is invisible. The Lap-Safe is locked overnight to prevent theft of TPCs and also charges the machines. As can be seen in Image 3.3, the TPCs can be moved around the classroom to provide a flexible learning environment.

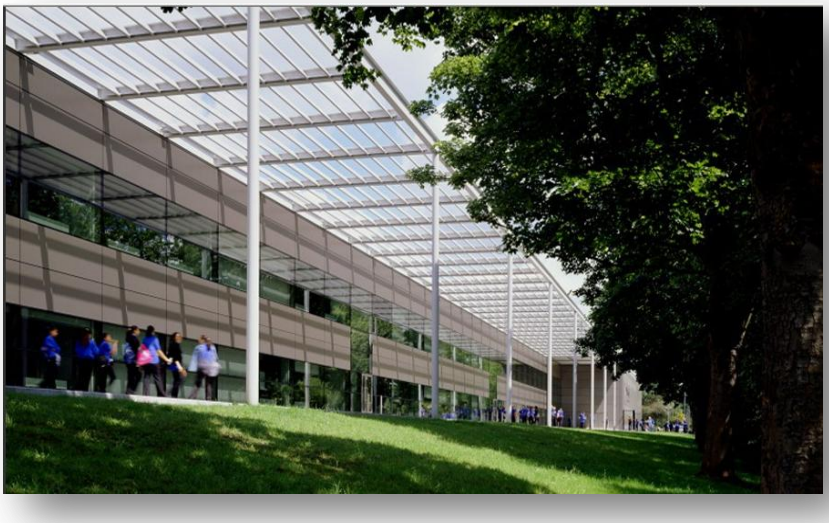

Image 3.2 11-14 centre.

Image 3.3 Using TPCs, LCDP and IWB at 11-14 centre

Each TPC was delivered with a tablet pen with which students can write directly onto the TPC when in tablet mode. This work can then be either projected to the class or sent to the teacher via intranet for marking and feedback. The classrooms also have a class set of Power Supply Units (PSUs) which prevent losing work through battery failure. The start-up budget cost of each TPC (in 2004) was £1,200 and each classroom has a class set of 24 TPC machines. Including PSU, Tablet Pens (scribing peripherals used for entering data), IWB and LCDP, each room has an educational technology provision of over £25,000.

The KS3 and KS4 buildings are less than three quarters of a mile apart and serve the same Hither Vale catchment area (I have referred to Brampton's 2009 OfSTED inspection for the following data). With 1623 students on roll, including 272 in the sixth form, Brampton High is a large and expanding school. As Brampton has become more popular, its catchment area has become increasingly localised. The majority of the students who attend Brampton live within a one mile radius of the school. Brampton has a small but increasing number of students who are from families of asylum seekers or refugees; 15% of students at the school have a first language other than English. The number of Brampton students who are eligible for Free School Meals (FSM) is 36%, an above average number and one which is increasing year-on-year. Linked to this is the very high proportion of sixth form students who are also eligible for FSM and – the now defunct - Educational Maintenance Allowance (EMA) payments. OfSTED's 2007 and 2009 reports indicated that the proportion of students with learning difficulties and disabilities is above the national and city average and increasing.

In 2009 at Yr13, of the 90% of students who passed A2 examinations, 65% did so with an A, B or C grade and 25% of those who passed did so at A grade. Nine students out of the fifty-six entered were awarded a U grade at A2. In year 11, of the 266 students who were entered for GCSE examinations, 60% of these were awarded five A*-C grades; if English and Mathematics are included this figure drops to 32%. Hither Vale is predominantly white and yet Brampton has a school population, which is over 50% non-white. The majority of Brampton's non-white students are Pakistani, Indian and black Caribbean. From this, it seems that although Brampton is the only secondary state school in Hither Vale, a significant number of white students go elsewhere. There are an increasing number of EAL and SEN students in the school.

3.2 Research design

My project argues that a critical exploration of technology is positioned in exploring teachers' nuanced and subjective experiences. I have drawn on a number of different sources for my design. For example, I have referred to Gates' (2000) work examining the professional orientation of two teachers - although Gates uses a sociological lens, I have found some of his experiences of design particularly illuminating. Although part of this project is inevitably sociological, the primary focus however is on examining technology via a combination of social, cultural and psychological viewpoints. This project is not free standing in either a practical or epistemological sense. My project does not close the book on educational technology, rather it is more of an 'interpretational foray' (Ball, 2006, p. 1). I have utilised an eclectic approach toward the project, an approach that employs a qualitative ethnographic case study design, a sociocultural, Cultural, Historical, Activity Theory (CHAT) theoretical framework, and an analysis employing 'activity theory'.

Sociocultural psychology and Cultural, Historical, Activity Theory (CHAT)

Sociocultural psychology, and specifically Cultural, Historical, Activity Theory (CHAT), is the framework for this project – sociocultural research is the general tradition, with CHAT being a 'branch' of that tradition. Sociocultural psychology has its antecedents in a synthesis of sociological and anthropological approaches to research (Valsiner & Rosa, 2007, p. 2). These antecedents are shared by CHAT - the sociocultural context of a setting is explored so as to understand how individuals experience the activities in which they participate.

Sociocultural psychology and CHAT have been used to explore the 'mediated' nature of tools, artefacts and activities (see for example, Wertsch 1991, 1998; Wertsch *et al*., 1993; Valsiner & Rosa, 2007; Engeström, 1987b, Kaptelinin, 1996; Karasavvidis, 2009; Yammagata- Lynch, 2010). Both a sociocultural and CHAT approach to research begins with the assumption that action is mediated, and where organism and environment are not mutually exclusive. The notion of mediation developed from Lev Vygotsky (1978) who suggested that human beings' interactions with their environment are mediated by tools. Mediated action is a semiotic process between individuals, artefacts and the object of an activity - as Daniels (2001, p. 1)

notes, 'In sociocultural theory the emphasis is on semiotic mediation with a particular emphasis on speech. In activity theory it is activity itself which takes the centre stage in analysis'.

In sociocultural psychology mediation underpins individual's interactions. For Wertsch (1985, p. 78), in such interactions mediated action contributes to the social formation of consciousness. Individuals' interactions support their meaning of the world through an 'active process' (Wertsch *et al.*, 1995, p. 23) of transformation of artefacts and tools in their environment. The introduction of new cultural tools into this active process inevitably transforms that process. Tools do not facilitate forms of action what would 'just' occur - tools alter 'the entire flow of and structure of mental functions' (Vygotsk, 1981, p. 137). Later in this chapter I explore the notion of mediation within the specifics of activity theory analysis. However, as Wertsch *et al* (1995, pp. 22-28) continue, there are a number of fundamental points to consider in relation to mediation:

- Mediation is active
- Mediation has transformatory capacities
- Mediation is both constraining and empowering
- Mediation can result as a unexpected or unintended 'spin off'

Mediation is part of the relationship between person and environment. The person interacts with their setting via cultural tools - this is not a one-way relationship as the environment is shaped by these tools, whilst also being shaping the tools themselves. Drawing on the sociocultural research tradition supports the basic goal of the project – that is, to examine technology, and teachers' experiences of technology in 'cultural, historical and institutional settings' (Wertsch, 1991, p. 6). Similarly, CHAT supports this goal by examining the complex interactions between individuals and their environment (Yamagata-lynch, 2010, p. 23).

Sociocultural psychology developed out of the work of Vygotsky (1978) Cole (1996), Rogoff (1990) and Shweder (1991). CHAT also shares its beginnings with Vygotsk (1978), and one of his students Aleksey Leontiev (1974). As well as Vygotsky and Leontiev, my reading of the CHAT model has been informed by a number of authors who use this approach, most

prominently Yrjo Engeström, (1987b, 2010); Lisa Yamagata-Lynch, (2007, 2010); Kari Kuttii, (1996); and Victor Kaptelinin and Bonnie Nardi (2006). The link between sociocultural and CHAT frameworks is the acknowledgment of the relationship between mediation, artefact and activity. Like a sociocultural perspective, CHAT situates human societies and their individual members as mutually constitutive – culture plays a role in shaping the thoughts, assumptions and beliefs of individuals whilst individuals' thoughts and deeds serve to maintain, or alter, society (Kaptelinin & Nardi, 2006, p. 36).

Like sociocultural research, Key in CHAT is the meditational role of tools (kaptelinin & Nardi, 2006, p. 248). Human beings have developed a wide array of tools which support and elaborate cultural life - tools extend and mediate human actions and both the tool, and the associated practices, can be passed on by and improved upon generation by generation, or fall into disuse and become discarded. For this reason, to explore both individual and social activities rather than exclusively focus on solitary actors, it is necessary to examine the communities to which they belong and the tools which support the attainment of goals.

Wertsch (1998, p. 485) describes 'actors-acting-with-meditational-means' – for Wertsch, tools and action are so mutual interlinked that we cannot be understood without considering them together. Tools are not purely physical and technological objects such as computers and IWBs. Tools can also be 'meaning making', such as rules, norms and practices, which mediate communication and reflection – as reflected in Vygotsky's (1978) work exploring language, internalization and the Zone of Proximal Development.

In an educational setting, the study of the culture of organisations such as a school reveals an understanding of educational environments as workplaces (see for example, Westoby, 1988; Ozga, 1988). A CHAT framework positions culture as integral in understanding the interactions between people and tools. In CHAT, tools have gained value within activities over time (Yamagata-Lynch, 2010, p. 17). As such, a cultural tool is not temporary – unlike an artefact which is yet to develop into a historical and cultural tool – there is a process of decision where the tool is considered to be worthy of use, and development. This identification of tools as cultural has a resonance with the aim of the study in exploring teachers' experiences of

educational technology. CHAT mediates a focus on technology not as separate from the culture of the setting in which it is introduced but as part of a relationship between the two – culture shapes tools, tools shape culture (an assertion which fits with the SST I discussed in Chapter 2). Cultural tools have evolved over time to become a 'critical community resource' (Yamagata-Lynch, 2010, p. 140) – cultural tools mediate participants in their attempts to attaining the objects of their activities.

Focussing on the cultural and historical context of teachers' experiences of technology is developed through the relationships between different components of their activities – CHAT supports my exploration educational technology through the rules, communities and divisions of labour in the research setting, and how technology acts as a meditational tool between teachers and these components. Positioning this project as broadly sociocultural, and specifically within a CHAT framework, is part of the critical view of technology I examined in the previous two chapters. Using CHAT supports my critical claims for the project by mediating an examination of what might be deterministic assumptions regarding technology. Through identifying, and exploring, the conditions where technology mediates activity systems I am able to highlight the conflicts between the components of these systems. CHAT researchers focus on identifying conflicts, or 'contradictions' (Engeström, 2010, no page) in different technologically mediated systems so as to resolve these tensions and move toward new systems. Exploring technology through the cultural, and historical, context of Brampton High leads to a greater understanding of teachers' experiences of technological tools within the school.

This project generates and analyses qualitative data. I am concerned with exploring the 'continuing weaknesses' (Selwyn, 1997, p. 305) of educational computing research - weaknesses Selwyn suggests are indicated by the avoidance of qualitative methodologies and a mistrust of using theoretical analysis. To address these concerns, I use both qualitative data and theoretical analysis in this project. A qualitative approach to research can be seen as 'particularly suited to examining the complex and dynamic contexts of public education in its many forms, sites, and variations' (Lincoln & Cannella, 2004, p. 7). These 'dynamic contexts' of education informed my qualitative approach to the project; the research literature (and from

my own experiences as a teacher), suggest that the relationship between technology and teachers has the dynamic qualities which qualitative research examines. However, qualitative research is not solely concerned with the relationship between participants and context – such an approach to research is also concerned with the role of the researcher as qualitative research positions the researcher as an 'observer':

> Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations… At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meaning people bring to them. (Denzin & Lincoln, 2005, p. 3)

The location of qualitative research as situated and interpretational underpins the importance of this approach in exploring 'the sort of people teachers are, and how they see themselves and the work they do' (Sikes, 2001, p. 88). That the qualitative researcher examines how teachers' see the work they do, and who they are, encapsulates the focus of this project. Using a qualitative framework, mediates the opportunity for me to engage with the relationship between teachers and technology. My qualitative approach acknowledges that to understand teachers 'we need to understand more about teachers' lives' (Goodson, 1992, p. 35). The motivation for this project is that to understand more about educational technology we must find out more about the lives of teachers who use technology – a motivation that resonates with the qualitative approach to the project.

Ethnography

This project is based on an 'ethnographic' (Hammersley & Atkinson, 1995) 'case study' (Stake, 1995) research model. Deciding to conduct an ethnographic case study was not a quick decision. Whereas case study was obvious (Brampton High lent itself neatly as the single case to be examined), ethnography required an extended investment of time, energy and focus. Ethnography does not sit as a universally agreed methodology in the educational research community as the claims for research to be ethnographic, and indeed what actually constitutes ethnography, are contested (Hammersley & Atkinson, 1983, p.1). Walford (2007, no page) for example, describes ethnography as 'simultaneously one of the most exciting and misunderstood research methodologies and research products within educational research'.

Ethnography in educational settings has been a part of educational research since the 1960's (Walford, 2007, no page). There is a wide and varied educational research literature which uses the ethnographic tradition as its basis (see for example, Ball, 1981; Walford and Millller, 1991; Lortie, 1975; Delamont & Galton, 1986; Pollard, 1985, 1996; Jeffery & Woods 1998, 2003; Weiss, 1985, 1990). These authors have contributed important research on topics such as teachers' lives, teachers' stress, and the social and cultural implications of being a school teacher. As well as these studies, there are three pieces of research which were seen as particularly influential in the field of educational ethnography in the UK - David Hargreaves (1967) work in the secondary modern school; Colin Lacey's (1970) ethnography of a boys' grammar school; and Audrey Lambart's (1976) focus on a girls' grammar school. Whilst these projects could be seen as models for the 'classical' educational ethnography, it is important to stress that educational ethnography does not have to be conducted within the confines of the school or the classroom – see for example Delamont's (2006) work on martial arts teachers.

Ethnographic case study research does not lend itself to making conclusions in terms of 'carefully tested hypotheses' (Ball, 1981, p. 280) - the ethnographer will have a general focus which is developed, refined and altered through time in the research context. For Ball (1981, p. xvii), ethnography does not only focus on what is happening but explores *why* it is happening – a positioned echoed by Johnson and Johnson's (1990, p. 167) assertion that ethnographic research is about examining an organisation as a holistic entity. Crucially, ethnography is not simply case of 'hanging around' in a research setting (Woods, 1996, p. 52). To produce a trustworthy piece of ethnographic research the researcher has to address a number of concerns before being able to claim an ethnographic warrant. There is a wide range of texts which support the researcher embarking on an ethnography – see particularly, Hammersly (1990a, 1990b, 1992); Hammersly & Atkinson, (1983, 1995); Walford, (2001, 2008); Woods, (1986, 1996); Delamont, (2002); Coffey & Atkinson (1996); Lincoln & Guba, (1985); Kvale & Brinkman, (2008); Strauss & Corbin, (1990). Hammersly and Atkinson (1995) in particular approach some of the key challenges facing the educational ethnographer such as the importance of 'analytical and thematic order':

> …a common problem faced by ethnographers is how to translate their knowledge and descriptions of a given culture into a serial order whilst simultaneously imposing some sort of analytical and thematic order upon the material. (Hammersly & Atkinson, 1995, p. 221)

Engaging with methodological concerns such as these reveals the complexity of ethnography. My reading of research literature regarding ethnography has mediated an understanding of the challenges and pitfalls of this approach. Despite these concerns, ethnography has supported this project both methodologically and philosophically – for example, ethnography is not pre-determined with a simple checklist to follow, for Woods (1996, p. 70), it is more an act of faith:

> [Ethnography]…is an open approach, not pre-determined, inductive more often than deductive, with theory generated and grounded in the data. Ethnographers do not know what they will find. Initial work is typically messy and chaotic, until themes begin to emerge. Ethnography is an act of faith, requiring strong initial commitment. Some prefer the security of more systematic methods.

My remit for using ethnography was underpinned by the importance in describing how technology mediated activities in relation to the society and culture of the school through examining the 'interconnections between them' (VanMaanen, 1988, p. 1) – as Asad (1994, p. 57) indicates, ethnographic research pertains to examining a setting as an 'experiential whole'. As with the wider field of educational research, there is also a tradition for ethnographic research in the field of educational technology - an area with obvious resonances with this work. Of these pieces of work, Janet Ward Schofield's (1995), *Computers and Classroom Culture* was particularly illuminating (see also, Ward Schofield & Davidson, 2003; Monahan, 2005; Garrison & Bromley, 2004).

For example, Ward Schofield (1995, p. 120) interviewed a teacher, Mr East, who described how computers seemed to be nothing but a 'Band-Aid':

> It [having computers] is just like having a Band-Aid…we need it to look [good]. We need to bring people into the building or take them over to the computer lab and say, "See this? Isn't it wonderful?" We need to bring in the press.

Mr East's comments have a resonance with those of both Nicola and David - Nicola makes comments bearing a striking similarity, and which resonate both with Ward-Schofield's data and with what Gerwitz *et al* (1995, p. 127) suggest is the 'glossification of school imagery':

> *Nicola - The press is in the school so often. We've been on Teachers TV lots of times, and we've had visits from the PM* [Prime Minister Tony Blair] *and the Secretary of State* [for education]. *And of course they talk to the kids, and have photo opportunities with them, but the focus is always actually on the computers – this application, that piece of software, it's like everyone is saying look at all this, isn't it great.*
>
> (Nicola – Interview, KS4 Staff base, lunch)

Ethnography involves immersion in the research setting over an extended period of time - the researcher is herself a participant in the setting. For Hammersley and Atkinson (1983, p. 2) ethnography is about the researcher overtly or covertly taking a part:

> …in people's daily lives for an extended period of time, watching what happens, listening to what is said, asking questions; in fact, collecting whatever data are available to throw light on the issues with which he or she is concerned.

The notion of collecting 'whatever data is possible' might suggest a lack of structure to data generation in ethnography. However, although authors such as Woods (1996, p. 70) assert that ethnography is not predetermined and 'chaotic', this does not mean that there is a complete lack of structure to the methodology. Indeed, in such potentially chaotic circumstances some structure is of the utmost importance. To mediate such a structure, I have drawn on Troman's (2006, p. 1) 'checklist' of key ethnographic elements:

- the focus on the study of cultural formation and maintenance
- the use of multiple methods and thus the generation of rich and diverse forms of data
- the direct involvement and long-term engagement of the researcher(s)
- the recognition that the researcher is the main research instrument
- the high status given to the accounts of participants' perspectives and understandings
- the engagement in a spiral of data collection, hypothesis building and theory testing—leading to further data collection
- the focus on a particular case in depth, but providing the basis for theoretical generalisation

Reflecting on, and integrating, these seven points gave the necessary structure to the methodology whilst not unduly constraining my attempts at answering the research questions. Troman's initial point is that ethnography should focus on the culture of the setting being investigated. This resonates with what Walford (2007, no page) calls 'cultural context' – to

understand some of Nicola and David's experiences of educational technology it is necessary to acknowledge that the behaviors, meanings and values of these teachers are located in the cultural context in which they participate. Consequently, I was interested in both the minute detail of their activities, allied with the wider structures of society, culture, schools and education.

Troman's (2006, p. 1) second point, is where he calls for the use of 'multiple methods', data sources and recording approaches to be used. Employing different approaches to generating data within ethnography can be seen as achieved through direct methodologies – the researcher asks people about what they are doing and observes them in their everyday activities (Walford, 2007, no page). Using various research tools, and to consider various types of data, is necessary so as to 'develop the story as it is experienced by participants' (Woods, 1994, p. 311). I used both semi structured interviews, and observation as my data generation methodologies. This included interview and observation of the key informants, and of those involved in the wider context and culture of the setting. I also referred to documentation such as OfSTED reports, photographs and images, and the school's intranet portal and internet website.

Troman's (2006, p. 1) third point is that the ethnographer is directly involved with the research setting over an extended period. The process of data generation is not one where the ethnographer is removed from the setting. Engagement is a central tenant of ethnographic field work – 'first hand' involvement in the setting means more than simply turning up and standing around. The principle of engagement in the research setting has two elements:

> …human connection with participants, and an investment of time. There is an assumption that, as the researcher becomes a more familiar presence; participants are less likely to behave uncharacteristically. The idea is that participants 'perform' less, and, as trust builds, reveal more details of their lives. So the success of an ethnography depends on the researcher developing and maintaining a positive personal involvement with participants, and returning perhaps many times to the field. (Walford, 2007, no page)

Engagement therefore is part of developing trust and relationships between researcher and informant. My involvement with school supported a constant exiting from, and returning to, the setting. Moving from site to site, attending school meetings, Continued Professional

Development (CPD) sessions and a host of extra-curricular events constantly mediated my engagement not just with the physical setting of Brampton High, but also with the culture at the school.

Engagement in the research setting also underpins Troman's (2006, p.1) fourth point where he outlines the position of the researcher as research instrument. With such an extended and intense engagement in the field the ethnographer becomes their own primary source of data. The methodological issue here is the bias of the inevitable subjective assumptions of the researcher in such a context. In practice, being aware of such bias required a constant checking, and cross-checking Nicola and David's claims, and also of my own interpretations and analysis. I would develop questions and hypothesis through a process of triangulation. I would not rely solely on the claims of single teachers, or my own understanding of the context – acknowledging myself as the main research instrument required a regime of regular reflection, and reflexive engagement, with what was being said, asked, observed and recorded.

Engagement with the setting, and the relationship between researcher and researched, supports Troman's (2006, p. 1) fifth point which he calls the 'high status' ethnography gives to what participants say and do. The importance of insider interpretations (Hammersley & Atkinson, 1983, p. 105) reflects the knowledge that informants have of a setting which are unique to themselves. However, just because someone expressed a view, or recounted an experience, this does not necessarily mean that these reflect the culture of the setting as a whole - high status does not mean that multiple perspectives, and triangulation of claims, should not be part of the ethnographic model.

This notion of status leads to Troman's (2006, p.1) penultimate point. Data generation is part of a spiral where data, hypothesis and theory testing are part of an iterative process which leads to further data generation. I have used data from a number of sources - to triangulate the claims of the two key informants in an attempt to articulate more fully Nicola and David's experiences of technology. In this model, the generation and analysis of data is not and end-

point in the ethnographic process - there was a constant examination and re-examination of the questions being asked, findings being presented, and conclusions being made.

The final point in Troman's (2006, p. 1) checklist is the focus in ethnography on a particular case which provides the basis for theoretical generalsiations. I am suggesting that it is possible to make 'petite generalisations' (Stake, 1995, p. 7) which demonstrate resonances between the experiences of the key informants. Although ethnography might not be generalised from in the same way as quantitative research, this does not mean that within the case being studied there might not be similarities between informants' experiences of that setting.

Key to Troman's ethnographic model is both acknowledging the presence of subjectivity in ethnography, and not ignoring the challenges this brings. Subjectivity is fundamental to the ethnographer being 'part of the social world we study' (Hammersley & Atkinson, 1983, p. 14). A balance needs to be made between assumptions and preconceptions, and beliefs and understandings. This requires a constant awareness of the evolution of the ideas – why did this idea happen, what were the questions asked, why were those questions asked? I entered the field with some general issues in mind and a theoretical framework which directed my attention toward certain phenomena. Developing these general issues before spending substantial time in the research setting reflected an underpinning concept of ethnography - that is, the influence the researcher on the setting studied (Hammersley & Atkinson, 1995, p. 11). An ethnographic approach to research acknowledges that the researcher has an impact on the socio-cultural setting of the project. The ethnographer is both aware 'that there is no way in which we can escape the social world' (Hammersley & Atkinson, 1995, p. 15), and of the importance to engage with the consequences of being part of the research setting.

For Hamersley and Atkinson (1995, p. 18) the ethnographic researcher is the research instrument '*par excellence'* with reflexivity taking a central role. Reflexivity acknowledges 'past experiences and prior knowledge' (Wellington, 2000, p. 44) and challenges the notion that data can be free from researcher influence (Hamersley & Atkinson, 1995, p. 14). The position I have taken is that the reflexive nature of social research is located in my role in the context being explored. I cannot escape the social world in order to investigate it. Reflexivity is about

my role as a participant observer, my participation in the social world of Brampton High, and my experiences of the phenomena revealed through that participation. Rather than make 'futile' (Hamersley & Atkinson, 1995, p. 17) attempts to eliminate my effects as the researcher, understanding these (inevitable) effects underpins the reflexive process.

3.3 Conducting the research

In this following section I examine how I conducted the research, gained access to Brampton, and identified teachers willing to participate in the project. The starting point for gaining access to the school involved meeting Kim Stevens, Brampton High's head teacher. Part of the discussion I had with Kim revolved around the activities I would be engaged in. Kim's concerns were that my presence should not interfere either with students' learning, or the operations of the school. Reassuring Kim that I would not be walking around with a clipboard was part of this process. Kim and I had a further meeting where I presented a research proposal, and the ethical clearance for the research from the University - it was after this meeting that I obtained access to the school.

To give some context to the process of conducting the research at Brampton, it is relevant to discuss a brief biography of my time working as a teacher at the school. I began work at Brampton in the Science faculty in September 2002. I resigned from the school in July 2006 as a full time teacher, to begin this research project. I worked part time at Brampton during the direct fieldwork stage of the project between September 2006 and January 2010. The major part of the writing of this thesis was between January 2010 and February 2011.

My participation in the life of Brampton High was situated in both teaching and non-teaching activities. In the first year of the project I was in school three days a week. I was timetabled to teach 12x50 minute periods over two days which were mostly year 12 and 13 AS and A2 physics classes. I also taught KS3 and KS4 science, and KS4 mathematics. As well as these teaching periods I participated in tutor sessions, break duties, report completion, and attended parent's evenings. I took registers, covered lessons for sick colleagues and played for the staff football and cricket teams. During the second year I was again in school for three days a week, sometimes four, and I continued with the same teaching commitment as in the first year. In

the final year I visited the school two days a week until January as I had reduced my teaching commitment to only 6, 50 minute lesson each week to concentrate on the research project itself. During all three years of fieldwork I conducted participant observations, interviewed Nicola, David and other informants, and spent some time in the community surrounding Brampton High.

For the project's pilot study, I worked with a group of six informants who I contacted directly via email. This group consisted of teachers of mixed age, gender and ethnicity, and from a range of faculties and management positions; two from Science (one of which was David), one from English, one Maths, one Information and Communications Technology (ICT), and one from Design and Technology (DT). After the pilot study data generation was completed I re-approached these original six teachers to see if they would consider extending their participation into the main project. I was hopeful this might be a case where most if not all the informants agreed to continue. However, some of these teachers suggested that the commitment to the research was too much and eventually five of the original six informants withdrew their participation at the beginning of the full project.

Consequently, I was left with a single informant; only David remained from the original six teachers. Although I considered working only with David this approach did not sit well. I was not making a choice to work with one teacher - I only had access to one teacher. I made a decision to email all teaching and support staff at the school in an attempt to contact anyone who had not been part of the pilot. Unexpectedly I received an answer. The reply came from Nicola Howard whose offer of participation was an exciting development for me. Instead of the sample size being dictated to me, I was in a position to decide whether to framework the project around one or two key informants (I use this term to delineate between Nicola and David as the key informants in the project and other actors whose experiences contextualise the data). Eventually I decided to work with both Nicola and David as access to two key informants gave me the opportunity to explore a larger number of interviews and to cross check the claims of one teacher with the other.

Interview

In this section I discuss the data generation methodologies I used in the project - interview and participant observation. Ethnographic interview makes use of 'reflexive interviewing' (Hammersley & Atkinson, 1995, p. 113) which acknowledges that interviewing is, what Kvale and Brinkman (2008, p. 18) call, a 'social practice' - interviewing in an ethnographic project is not simply a task of asking 'set' questions and looking for statistical generalisations from the answers – it is more located in developing relationships:

> …interviewing within ethnography is not formulaic, but a delicate process of negotiation between the interviewer and the interviewed. In ethnographic work the interviews are always embedded within a long-term and developing relationship and are never simple one-off events. (Walford, 2007, no page)

I did not decide at the start of each day of fieldwork a list of specific questions to be asked – the questions emerged through the day (although I did occasionally use a broad list of issues of interest). Positioning interview within an ethnographic framework raised deep questions as to what interview, be it reflexive or otherwise, meant. I decided that rather than using the term interview (a word loaded with epistemological and ontological assumptions) 'guided conversation' (Walford, 2001, p.89) might be more appropriate. Acknowledging interview as a social practice - albeit a guided one with its own rules - reveals interview as non-neutral. The supposed simplicity of person A talking to person B and then recording what was said is not as straightforward as it seems (Wragg, 2002, p. 143). Interview, as with all social interaction, is co-constructed by researcher and informant:

> We know that interviewers and interviewees co-construct the interview and the replies to questions are produced for that particular occasion and circumstance. Interviewees will select their words with care (as in other formal occasions) and will moderate what they have to say to the particular circumstance. (Walford, 2001, p. 90)

Reflexive interviewing was the model I used for all but the first interview I conducted. Through having broad areas of focus at the beginning of the project, I decided to use a 'standardised interview model' (Hammersley & Atkinson, 1995, p. 113) for the initial interview with Nicola and David I used a 'semi-structured' interview schedule with the data from this interview informing further conversations.

For this first interview, I amended questions from the Activity Checklist Tool (Kaptelinin & Nardi 2006, p. 269) which can be seen Appendix 1-3. The Activity Checklist Tool (ACT) is located in an activity theory framework and, as Kaptelinin & Nardi (2006, p. 270) outline, can be used to evaluate the technology meditating different systems. I amended questions from ACT to focus on three areas of technology use; first, the extent to which educational technology facilitated and constrained Nicola and David's objectives; second, how the social and physical aspects of the school's environment were integrated via technological tools, resources and rules; and third, how the key informants' experiences of educational technology have developed over time.

I probed Nicola and David's responses to the ACT questions extensively to follow up on topics which the interviewees suggested were important - even if these topics were not part of what Ward Schofield (1995, p. 235) calls 'prepared sets of questions' which I might have previously identified. The ACT questions were the catalysts for the initial interview questions. Using the grounded theory/activity theory model I discuss later in this chapter, I analysed the data from the ACT interview and identified some specific concepts – 'benefit and threat', 'administration' rather than learning, 'social practices', and 'being a teacher'. These were the concepts which I focused on in the following interviews.

Observation

It was important for the data generation not to be exclusively interview. If I relied exclusively on interview then my analysis could only be based on what Nicola and David claimed to be the case. To cross check these claims, I used diverse vantage points to examine what and what I observed happening (Banister, *et al*., 2001, p. 145). For Denzin (1970, p. 310), using different methods to generate data indicates 'method triangulation' – that is, not relying on the claims of single informants but attempting to verify, or refute, these claims through drawing on different data sources. Being able to generate data from multiple methodologies, and then using these different data sources to cross check Nicola and David's claims, was a primary part of the research design.

The ethnographic texts I have referred to in this chapter contain considerable discussions regarding observation methods (see also, Foster, 1996; Delamont, 2008). From drawing on these texts, observation is positioned as only a single part of the process of ethnography. Observation is supported by interview and field notes to develop a multi-layered view of the setting:

> Observation is only the first step to writing an ethnography and the key link is the writing and use of field notes to record what has been seen and experienced. (Walford, 2007, no page)

In using observation as my second methodology there is a potential for confusion which needs to be addressed. Ethnography is sometimes referred to as 'participant observation' (Hammersley & Atkinson, 1995, p. 2) with the two terms being used interchangeably. I am referring to participant observation as a specific methodology within my ethnographic design, and as part of what Hammersley and Atkinson (1995, p. 16) call 'participating in the social world' of the research context. In an ethnographic model, participant observation is not merely 'observing' - it is a means of generating data itself and also of triangulating Nicola and David's claims.

For example, in an interview Nicola claimed that technology, whilst having undoubted benefits, also carried threat. Rather than take this concept of threat as a given, it was important to examine if this was a single teacher's viewpoint. I asked David, and other informants, about such a technological threat and then watched different teachers at work to see if I could crosscheck this supposed threat through my own observations.

As with interview I am not suggesting that observations are neutral:

> Observations do not come independent of concepts and theories, [or] apart from the prejudices and preferences we bring to the observing. (Pring, 2000, p. 35)

My use of observation was as loaded, biased and co-constructed as my model of interviewing. However, as Hammersley and Atkinson (1995, p. 16) indicate, despite this inevitable bias observation is an important step in engaging with the context of the research setting. Watching, as well as asking, was integral to my reading of triangulation. Observation was a

part of crosschecking the key informants' claims through a process of seeing for myself what was happening in the school.

As with structured and un-structured interview, observation can also be classified in these terms. My approach to observation was that it would be un-structured and consist of two strands. Firstly, observations would take place to triangulate Nicola and David's claims. Secondly, observations would generate data in their own right, without reference to previous events. In both cases, observation was unstructured in so far as I did not employ an observation schedule – as Delamont (1976, p. 101) illustrates, to disentangle the complexities of teachers' experiences requires an approach that moves beyond set, pre-determined, schedules:

> Systematic observation schedules can provide convenient data on certain aspects of classroom interaction…But such observation techniques can never show *why* teachers differ on such measures. Such questions are, by definition, beyond the scope of the method.

To address the concerns regarding structured observation, I instead used long-term unstructured observation (Delamont, 1976, p. 101). From interviews, and my own observations, concepts and categories would emerge. I would then develop these by moving through the school to observe the technological tool, or cultural process which was under investigation. I would take field notes in which I would catalogue the setting – the time of day, physical location and work context – and from these I would develop a view which either confirmed, or refuted, the two key informants' claims. On other occasions I would be conducting my own duties around the school and would observe a technology being used. From my observations concepts and categories would emerged. In this case however, the process of triangulation was reversed – I would interview staff to ascertain if they shared my experiences of technology. I would then observe a range of informants so as to confirm, or refute, my analysis of these observations.

Data

It is important to be as explicit as possible about ethnographic data so as to prevent misunderstanding or ambiguity (Hamersley & Atkinson, 1995, p. 156). Being immersed in the research context was a central part of trying to understand how teachers experienced

educational technology within the culture of the school. Topics emerged from the process of data generation, hypothesis building and theory testing which then led to further data generation. Because of my extended immersion in the research setting I was not constricted to time issues – for example, I did not have to conduct twenty 1 hour interviews with twenty teachers - I was able to speak to a number of respondents, on a number of occasions, for different periods of time. This is not to say that Nicola and David were not the main focus of the study. I was however able to generate 'rich and diverse forms of data' (Troman, 2006, p. 1) from other sources to give multiple perspectives – for example, documents, photographs and screen shots of applications mediated by the school's intranet. As Agar (1996, p. 4) suggests, in ethnography data should be 'wide-ranging, have breadth and be holistically comprehensive'.

Data Source	Structured Interview	Semi-structured Interview	Observation	Field notes
Nicola	1	47	73	80
David	1	40	77	72
SLT	0	10	4	8
HOF	0	9	17	21
Support Staff	0	4	12	15
Students	0	5	8	8
Parents	0	2	0	0

Table 3.3 Data Sources

Through the course of the project over 100 interviews, 200 observations and 200 field notes were generated (see Table 3.3). Most of the interviews were what I describe as informal – I did not use set interview schedules preferring to follow general themes which emerged from the data. When informants were on break and lunch duties, as well as after school, became prime times for interviews, between lessons and non-contact periods less so. I audio recorded interviews, which I later transcribed, although on occasion I was not in a position to make records of interviews whilst the interview was in process – sometimes it was not appropriate to make overt notes or audio record (see Woods, 1996, p. 52). Consequently, and as I discuss later in this section, I have identified in the text whether what is being presented is an

'interview' (i.e. a transcript of an audio recorded interview); a 'field note' (i.e. a reflexive recording of a conversation) or an 'observation' (i.e. a reflexive recording of an observed event).

Despite challenges relating to the recording of data being relatively common in ethnography, see for example covert ethnographies such as Fielding (1981), Walford (2007, no page) suggests that 'there is less published material on this aspect than one would expect'. To address some of these challenges it would seem that the most obvious tool to employ is that of memory. Using memory as a short-term approach to data recording can be used as long as the pitfalls of this method are acknowledged:

> Whilst it is possible to rely on memory to preserve this data over the course of the research, and some reliance on memory is unavoidable, there are limits to the amount of data that can be retained this way…it is essential to employ some system of recording data as, or as soon after, they are collected. (Hammersley & Atkinson, 1983, p. 145)

Like Hammersley and Atkinson, Kvale and Brinkman (2008, p. 179) are also cautious with regard to relying solely on memory – for these authors although this approach can be used to preserve data it is short-term and carries the danger of distorting what was said or seen. From drawing on the literature, relying solely on memory is an approach to data recording fraught with methodological dangers – and one I quickly rejected. However, I did draw on Woods' (1996, p. 53) comments regarding a multi-faceted approach to recording data:

> The ethnographer therefore cultivates the art of memorizing key words and images for commitment to written record as soon as possible. He or she notes key aspects or comments on scrap paper or even a sleeve, summarizing incidents with 'key words' that will recall whole incidents, speaking into a Dictaphone, punctuating the period of observation with 'recording slots' to ensure against 'drowning' in the data…

Following Woods' suggestion, I tried to complete field notes as quickly as possible after the observation or interview. The digital audio recorder I used for recording my field notes of interviews and observations quickly became a tool I considered as invaluable. At the beginning of the project I studiously hand wrote field notes cataloguing observations and interviews. After three months of this process it struck me that this was not a particularly efficient use of my time and I began to audio record. This is an approach echoed by Walford (2001, pp. 86-87), who writes in terms of both decreasing the time taken to hand write field notes, but also

of audio recording being less constraining than writing. When I look back on my handwritten field notes they are both stilted and located in a positivist language of attempted objective reporting. In comparison, my audio recorded field notes are free flowing, less stilted, and located in 'thick' and detailed description.

My aim was to capture what was said or what I observed with integrity (although there are inevitably some processes of selecting when making field notes). As Hammersley and Atkinson (1995, p. 146) indicate, field notes are not just a case of writing down what was seen and heard, but also of recording *how* something was said or done - my field notes included as much data as possible as well as what was said, or what I observed, I would also record location, date and surrounding context. I drew on the model used by Pollard (1996) who presented data in the text as either interview, as field notes of conversations, or as field notes of observations, with a clear indicator as to which form the data took. Using Pollard's model, I have included in brackets what was the context of the data presented, with data being both indented, and italicised in the text to provide further delineation. This is an important part of making clear what is data and what is analysis.

To illustrate this method of data presentation, I have included an example of each of these three approaches - the extract below is an example of interview data, in this case with Nicola:

> *A.C - So I guess you couldn't live without your computer!*
>
> *Nicola - The laptop's got so many features like the touch screen, and voice-to-text software and really good Internet connection. What's happened though is that the more things it can do, the more jobs I have to do.*
>
> *A.C -What do you mean you've got more jobs to do – haven't you got more time?*
>
> *Nicola - No, it's not made my life easier.*
>
> *A.C Really?*
>
> *Nicola - No, I mean it, the more things the computer can do equates to the more things I have to do. And there's this assumption that because everything's 'e' based there's more time and there just isn't.*
>
> (Nicola – Interview, Staff base, after school)

In the second approach, I present field notes of conversations I have overheard or participated in – what follows is an example of a conversation I overheard between a HOF (Shazad) and a teacher (Gail) regarding the use of restricted access Read Only Files (ROF) to store data:

> *Gail – So all the moderation data is ROF?*
>
> *Shazad – Yes.*
>
> *Gail – So if I want to change something are you telling me I have to email you so that you can clear me to get access?*
>
> *Shazad – Yes, that's how I understand it.*
>
> *Gail – So I can't be trusted?*
>
> *Shazad – That's no it at all. There's just this worry that the data has to be reliable. They* [SLT] *just want to have more of a handle on whose accessing what.*
>
> *Gail – It might seem like that to them, to me it's like I can't be trusted.*
>
> (Shazd, Technology HOF and Gail, Technology teacher - Field note, faculty meeting, KS3 technology room, after school)

Field notes are also be in the form of documents, photographs, images and screen shots of applications mediated by the school's intranet.

In the third approach, I catalogue my observations of the different technologies under investigation. In the following exert, David, and a colleague Susan, are trying to use an on-line system to enter data into spread sheets on their TPCs during a non-contact period (non-contact time is an agreed weighting of teachers contracted time where they are able to plan lessons and perform administrative tasks):

> *David was becoming frustrated with e-portal* [the school intranet system] *as the connection between his computer and Susan's was constantly disconnecting and then re-connecting. After around 5 minutes of trying to log back on, and then losing connection, he was forced to use a different method from the on-line data entry system. David opened a word document and word-processed his comments into this document. He then asked Susan if she had a portable hard-drive or USB memory stick. She said she had, but that she had left it at the other site.*
>
> *Susan had relied on the intranet system being glitch free. To transfer his comments into Susan's version of the PMR form, David used his USB memory stick – this required a process of saving the work onto the stick, removing the stick from his machine, and then inserting it into a USB port in Susan's machine. This process appeared to become the most time-consuming part of the entire activity. Susan commented at how stressed she felt because of the PMR, and that the problems with the intranet just amplified her stress.*

(David, SLT, and Susan, Science teacher – Observation, KS4 science lab, non-contact period)

This final example is of an observation and follow-up interview – in this case, Clive, a science teacher, is attempting to electronically enter attendance data on his TPC whilst also having to use the machine to project instructions for a lesson starter:

The class are having difficulty focusing and are getting rowdy. Clive is getting frustrated with trying to complete the register on e-portal. The starter activity is projected onto the IWB from his laptop – however, the photocopier was faulty this morning and he did not have time to print out a class set hard copy of the starter activity instructions.

Because Clive did not want to project the e-portal register so the class could see it, he had to disconnect his laptop from the LCDP, and with it, the starter activity. Eventually Clive had to abandon taking the register and attend to the class – as soon as the starter activity instructions were projected the class immediately became engaged with the task and started to refocus. Clive completed the register at the end of the lesson although outside the allotted data entry window.

(Clive, Science teacher – Observation, KS3 Science lab, morning)

After the lesson I followed Clive down the corridor and asked him what had happened:

Clive - I had to get the class back on task…

A.C – It seemed like you had to make a choice – either you used the laptop for admin or for learning…

Clive – I suppose…I should've had the starter on a separate sheet though. I know that lot can be a bit lively if they're not supported.

A.C – So you did the right thing?

Clive – Yeah…but I'll get an email now saying that it is my responsibility to enter the data within 20 minutes of the lesson starting. I will have been told off…I don't care though.

(Clive, Science teacher – Field note, kS3 corridor, morning)

Trustworthiness

Reliability and validity in qualitative research have been extensively discussed (see for example, Lincoln and Guba 1985; Guba and Lincoln, 1994, 2005; Charmaz, 2005; Wellington, 2000; Bell, 1996) Rather than make highly technical claims for reliability and validity, I am suggesting that this project should be examined in terms of what Denzin and Lincoln (2005, p. 184) call 'trustworthiness' and which Bryman (2000, p. 273) suggests consists of 'four criteria':

- Credibility, which relates to the believability of the findings

- Transferability, which relates to how findings apply to other contexts
- Dependability, which relates to the repeatability of the findings
- Confirmability, which relates to acknowledging the effect of the researcher on the research

For Charmaz (2005, p. 529), credibility, is first located in the researchers familiarity with the setting; second, that the range of data is sufficient to warrant the claims that are made; third, there are comparisons between, and within, data sets; fourth, there are strong links between the data and the researcher's arguments and analysis; and fifth, that there is enough evidence for the reader to form their own opinion upon the work. My approach toward credibility was informed by Charmaz's (2005, p. 529) work, and mediated by a process of reflexivity which would require me to ask myself whether what I recorded appeared to be a credible reflection of what happened. This was a process of internally auditing what seemed to be the case. I then externally audited by crosschecking what I had identified through engaging informants to feedback to me the feasibility of the data - and range of data - I presented, the analysis I made, and the claims I presented.

Transferability, is one of the criteria for a constructivist, and interpretative, approach to research as outlined by Denzin and Lincoln (2005, p. 24). Key to transferability is the depth of description presented to the reader. To achieve this, I have focused on what Geertz (1973, p. 3) describes as 'thick descriptions', to give a rich account of the key informants' experiences of educational technology. The richness of my accounts locates the project as providing a database (Lincoln & Guba, 1985, p. 316) from which judgements can be made about the transferability of these findings to other contexts. Transferability mirrors the external validity or generalisability of quantitative research (Wellington, 2000, p. 98). I am not suggesting that transferability and generalisations from this project stem from identical experiences. However, whilst ethnographic case study research is of a unique context, as Wolcott (1995, p. 175) maintains, this context is not *completely* unique and therefore lessons can be learnt which can be applied more generally – there are resonances between informants experiences which leads to transferability between these experiences.

Dependability was underpinned by the 'triangulation' (Denzin, 1970, p. 310) of Nicola and David's claims through employing multiple data sources. For Walford (2001, p. 81), using data generation tools other than interview is key in triangulating the claims of those being interviewed and observed. Using informants other than Nicola and David, and drawing on data from sources such as documents, images and the schools intranet led to a greater level of dependability than exclusively focusing on two teachers experiences.

Confirmability shows that the researcher has acted in 'good faith' (Bryman, 2004, p. 276). To support confirmability, I have attempted to be aware of my own personal values and theoretical positions manifestly directing the research. Whilst acknowledging that complete objectivity is impossible in social research, I also acknowledge that I have conducted the research in good faith underpinned by reflexivity, auditing, crosschecking and triangulation.

Ethics

The ethical considerations of any research project are of utmost importance and need to be clearly defined. However, ethics do not necessarily exist as an uncontested and universally accepted concept. Rather than there being a specific set of ethics which can be transferred from setting to setting, ethics are more about informed judgements. Ethics permeate throughout research (Kvale & Brinkman, 2008, p. 16) whilst also being what Humphrey (1970, p. 71) calls 'situational' – the context of a situation impacts on the ethical considerations of the researcher. Thus, there is a process to complete in which the design, methodologies and analysis of a research project need to be considered in terms of this ethical continuum. Underpinning ethical research is respect for the dignity and privacy of those being researched (Pring, 2000, p. 143), achieved through strict ethical standards being 'maintained at all times' (Bell, 2005, p. 53). Central to this was integrating the 'non-negotiable' (Soltis, 1989, p. 129) values of honesty, fairness and respect – as Dingwall (1980, p. 888) acknowledges, 'competent fieldwork requires a clear conscience'.

In ethnography, ethics have a central part in the research methodologies employed. For example, whether data is generated from overt or covert research is a major ethical problem facing the ethnographer (Woods, 1996, p. 63). In line with Woods assertion, the design of the

project presented some important ethical considerations. For example, I would be immersed in the research setting and would be hearing and observing conservations, events and phenomena from many different co-workers. Consequently, I was overt about my presence as both teacher, and researcher, in the school and in almost all cases obtained permission before generating any data. However, on some occasions this was not possible. In these cases I approached the informant involved as quickly as possible after the event and retrospectively asked their permission whilst giving them full rights for withdrawing the data – no one took this course of action.

From consulting the work of a range of scholars in educational research literature (see for example, Burgess, 1989; Homan, 1991; Penslar, 1995), I considered the ethics of what I was doing at each stage of the research in an attempt to protect informants from harm (Murphy & Dingwall, 2001, p. 347). In response to the requirements of the University of Nottingham, the research was conducted in accordance with the British Educational Research Associations (BERA) Revised Ethical Guidelines for Educational Research (BERA, 2004) - see Appendix 4 and 5. I also referred to the Economic and Social Research Associations (ESRC), Research Ethics Framework. I also drew on Pollard's (1996, p. 292) suggestion that the informants were aware of the requirements of the research – that is, that there would be extensive record keeping, I would make an analysis of the data generated, and that eventually results would be published in an academic context. Informants could decline their involvement in the research at any time, and they only took on participation after having been given the opportunity to give full and informed consent for the research. This procedure also clarified the position of informants with regard to my use or non-use of data generated, up to the point of withdrawal. All informants were also given the opportunity to access my records for both triangulation and verification. Both Nicola and David, and the wider cohort of informants, commented on issues of triangulation, but not on verification.

My concern regarding the ethics of the project was perhaps heightened because of my role as a former teacher at the school – particularly as Small (2004, p. 89) argues that codes of ethical conduct are only ever relatively finished products. This has implications in terms of confidentiality and anonymity, as it may take a reader who knows me a short time only to

identify the school in which the research is set. However, I am confident that the lengths to which I have gone to give all the informants anonymity would render it difficult to identify any of the teachers and staff who participated in the research. Similarly, when I have been discussing the study at conferences and seminars I have omitted the opening chapter referencing my former association with Brampton High as a teacher. This is again in an attempt to maintain anonymity for both the school and the participants. However for the purposes of this thesis it has been important to retain this detail, as there are implications for the research design, data generation and analysis.

3.4 Analysis

To formulate my analytical framework my activity theory systems analysis consisted of two stages (see Yamagata-Lynch, 1997, 2010). In Stage 1, I identified concepts and contextual categories which emerged from the data, and used these categories to inform Stage 2, where I wrote models of teachers' activity systems. My aim was to present an analytical 'whole' which examined Nicola and David's experiences of educational technology through the identification of contextual data, activities and activity systems, and to suggest possible contradictions in those systems - the objective of the analysis was explore the key informants' story:

> …in the data presentation I write my report as if I am telling the participants' story to the reader. This story telling is not based on fiction, but instead a result of a constant re-examination of the data while comparing and contrasting multiple sources, and finding an accurate, credible and trustworthy story that the data is ready to share with others. (Yamagata-Lynch, 2010, pp. 71-72)

I used a systematic process of analysing and re-analysing the data, while comparing one source with another to identify similarities and differences (Yamagata-Lynch, 2010, p. 73). The importance of the context surrounding informants' experiences of the technologies which mediated their activities was reflected in the centrality of significant contextual information in my model of analysis:

> My role as a researcher was to present the participants' worldview of the context. In order to identify the contextual elements of the activity systems analysis, I included the recurring themes in the data set the participants reported as having affected their technology integration actives. (Yamagata-Lynch, 2007, pp. 453-454)

My model focused on defining and examining manageable units of analysis (Yamagata-Lynch, 2010, p. 6) which reflected the key informants' experiences of using educational technology; analysing the context surrounding these experiences was as informative as analysing the experiences themselves:

> …even though activity systems can be identified as isolated units of activities, those units exist within the broader, real-world context, which had to be reported in my analysis. (Yamagata-Lynch, 2007, p. 459)

I have written individual chapters examining my contextual and systemic analysis. In Chapter 4 I position my analysis of Nicola Harvey's data, and Chapter 5 that of David Sharma. In Chapter 6 I 'draw together' the contextual categories, activity systems and contradictions identified in the initial analysis, and then discuss resonances between these different strands of the analysis.

In the rest of this chapter I establish my analytical model. I have again followed the Yamagata-Lynch model (2010, p. 75); by first describing my reading of grounded theory and how the coding and categorisation of the data led toward an iterative process of analysis; then drawing activity system models and examining and testing those models; and finally returning to the data sets for re-examination.

3.4.1 Grounded theory

Stage 1 of the analytical process was the use of grounded theory to identify concepts and categories. Grounded theory emerged from the work of Glaser and Strauss (1967) and their focus on the analysis of qualitative data. However, there is no singular and definitive version of grounded theory due to what Atkinson and Delamont (2005, p. 833) describe as the 'contested nature' of the approach. Claiming to use grounded theory does not mean that I followed a specific epistemological or ontological process of inquiry. I employed a pragmatic approach to grounded theory analysis which aimed to 'capture the fullness of the experiences and actions studied' (Kvale & Brinkmann, 2009, p. 202). My reading of grounded theory was through blending a phenomenological focus on how Nicola and David experienced technology, with a hermeneutical interpretation of the ways in which they and I have constructed these experiences (see also Clapham, 2009b).

In grounded theory there is a 'close relationship' between data collection, analysis, and theory (Strauss & Corbin, 1998, p. 12). Thus, rather than make a cursory reference to 'using grounded theory' it is important to be explicit in my approach to this part of my analysis. I have used a two part grounded theory analysis; first identifying the tools used, and second the outcomes which result from the different phases of such an analysis (see Charmaz, 2005, p. 507). From drawing on grounded theory literature (see for example, Glaser & Strauss, 1967; Strauss & Corbin, 1998; Charmaz, 2000, 2005), my analysis used two tools, theoretical sampling and coding, which resulted in two outcomes, the identification of concepts and categories.

Theoretical sampling

For Glaser and Strauss (1967, p. 62), theoretical sampling is an approach to qualitative data analysis, which reveals 'categories and their properties'. In grounded theory, theoretical sampling is a process which links together data, analysis and the focus of further data generation:

> [Grounded theory is]…the process of data collection for generating theory whereby the analyst jointly collects, codes, and analyzes his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges. This process of data collection is controlled by the emerging theory, whether substantive or formal. (Glaser & Strauss, 1967, p. 45)

The coding of data informs the data the researcher investigates, and the hypotheses which are developed. Theoretical sampling focuses on refining ideas rather than increasing the data sample (Charmaz, 2000, p. 519). Part of this refining of ideas, is that the sampling and analysis of data is an ongoing process. Rather than 'doing' theoretical sampling as a distinct and singular stage of the analytical process, sampling is continuous – it is as much located in making comparisons between observations, places and events as interviewing participants (Strauss & Corbin, 1998, p. 201). Figure 3.1 (amended from Bryman, 2004, p. 305), shows the model of theoretical sampling I used in the project. Data analysed was generated from interview, observation, images, photographs, intranet screen shots and documentation, such as OfSTED reports. Theoretically sampling data continues to inform the hypotheses generated, the research questions asked, the data generated, and the coding of that data.

Coding

Coding gives the researcher the analytical scaffolding upon which to develop their grounded theory analysis (Charmaz, 2005, p. 517). The model of coding I used involved reviewing the data and giving labels to the parts which seemed to be of theoretical significance. This was a process where the data shaped the emergent codes, rather than attempting to fit data into preconceived codes (Charmaz, 2000, p. 515). Codes are devices used to 'label, separate, compile and organise data' (Charmaz, 1983, p. 186) - in the grounded theory model of coding, codes are not seen as 'fixed', more that they are in constant revision.

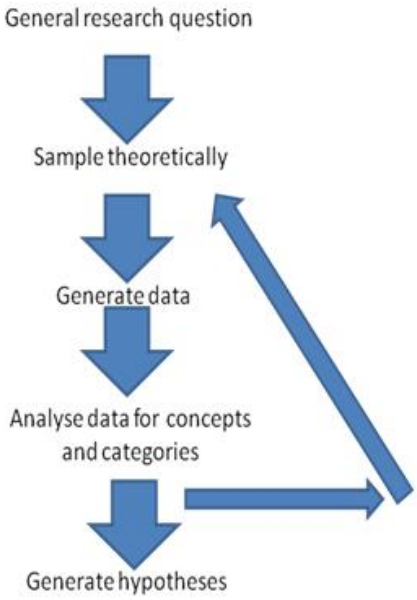

Figure 3.1 Grounded theory theoretical sampling

I examined different actions and events comparatively and then 'coded' (Strauss, 1987, p. 25) them as indicators of a particular classification of events or actions. The process of coding which best reflected the model I used is that of open coding (Strauss & Corbin, 1990, p. 61). For Strauss and Corbin (1990, p. 61), open coding initially yields codes called *concepts*, which are later grouped together to make *categories*. Grounded theory coding of data mediates multiple readings and renderings of the data (Charmaz, 2005, p. 517). Coding is a process where data – whether an interview, observation, document or intranet page - informs previous data. There were two outcomes of my open coding process which I amended from an approach indicated by Charmaz (2005, p 518, see also Bishop, 2005, p. 126)

- Identifying *concepts* which are labels given to discreet phenomena. Concepts are later grouped together to form categories
- The identification of *categories* is through a process of building up from concepts

Concepts therefore relate to discreet phenomena with categories linking groups of these phenomena together. The process of coding the data changed my focus of the project. I began by having an interest in how governmental policy decisions regarding educational technology mediated the development of educational technology applications in teachers' activities. From coding the data, this did not appear to be an important feature for the Nicola or David. Instead, coding data revealed technology mediating changes in pedagogy, performativity, teacher identities and communities. These concepts gradually formed categories which represented the major phenomenon present in the key informants' data.

3.4.2 Activity theory

From identifying codes and categories in the data, I then moved toward the process of drafting activity system models through using activity theory analysis. Earlier in this chapter I explored the CHAT framework for the project. It is relevant to discuss in more detail the genesis of activity theory as analytical tool from CHAT as theoretical framework. Activity theory analysis is the analytical framework which emerged from Vygotsky's examination of how human beings learn and develop (Holzman, 2006, p. 112) – it explores human practices and processes at social and personal levels (Kuutti, 1996, p. 25), particularly how individuals encounter their environment whilst participating in both individual and shared activities (Stetsenko, 2005, p. 72). Vygotsky (1978, p. 40) described this relationship as 'mediated action' where both organism and environment are not mutually exclusive of each other. For Vygotsky, mediated action was a process which included the relationships between subject (the individual or individuals); mediating artefacts (the tools used); and object (the objectives or goals) of an activity (Wertsch *et. al,* 1993, p. 339). Vygotsky represented this relationship via a triangular model of interaction as shown in Figure 3.2 (amended from Vygotsky, 1978, p. 40).

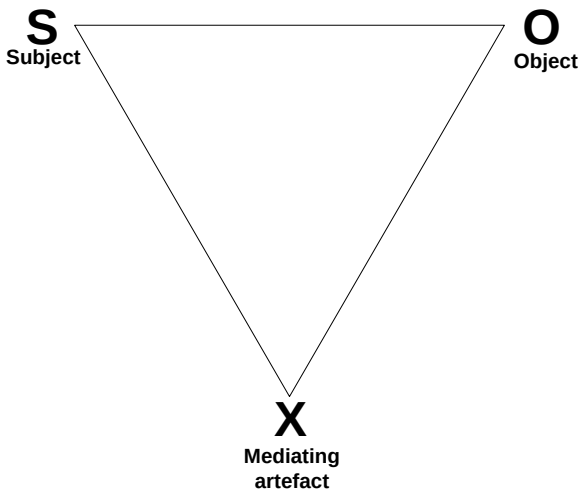

Figure 3.2 Vygotsky's model of mediated action

One of Vygotsky's students, Aleksey Leontiev, was instrumental in developing Vygotsky's model of mediated action into cultural-historical psychology, which itself became assimilated into CHAT and activity theory (Kaptelinin & Nardi, 2006, p. 36). Leontiev introduced activity as a basic unit of analysis focussing on behaviour and mental processes of human beings (Yamagata-Lynch, 2007, p. 455). Activity is regulated by the interaction between subject, object and tools and by motivation, action, goals and socio-historical context (Leontiev, 1974, p. 10). Researchers in a range of different contexts have used activity theory to examine workplace learning (Engeström & Kerosuo, 2007); to consider the use of ICT in teaching economics (Lim & Barnes, 2005); to assess handheld computers in collaborative learning (Zurita & Nussbaum, 2007); to examine how teachers' strategies learned in suburban settings, mapped to urban ones (Roth & Tobin, 2002); and to explore performative technologies in mediating the relationship between a teacher and his employer (Worthen & Berry, 2006).

Specifics of analysis

Whilst the terms 'subject' and 'tools' used by Vygotsky are relatively self-explanatory, a central point in activity theory is the use of the term 'object'. Whilst there is debate over the translation of object from Russian to English (Bakhurst, 2009, p. 198), it is important to be clear that the object of an activity is the reason or 'objective' of an individual or group for participating in an activity (see for example, Kaptelinin, 2005, p. 16; Wertsch, *et al*., 1993, p. 339). However, this does not mean that *all* subjects participating in an activity share the same

object, for example different users of technology might have different objects (Kaptelinin, 1996, p. 110). Objects are not stable; the process of activity adapts the object of that activity (Kuutti, 1996, p. 35). Involvement in activity may change the participants' relationships to the object of the activity (Gay & Hembrooke, 2004, p. 13). Leontiev's model of activity theory was itself modified by Yrjö Engeström (1987b). The result of Engeström's work - as shown in Figure 3.3 (amended from Engeström, 1987b, p. 78) - can be seen as describing activity in terms of a trilateral approach (Bakhurst, 2009, p. 199).

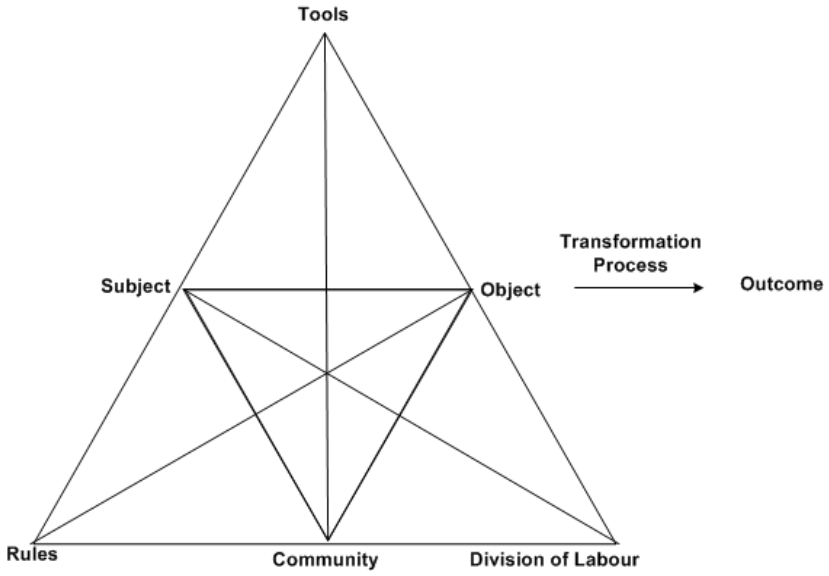

Figure 3.3 An activity system

Engeström's model of 'activity systems' (1987b, p. 78) addressed the relationships between components of an activity system, the object of that system, and the outcomes of that system. Activity systems analysis gives the opportunity to explore a 'three-way interaction' (Kaptelinin & Nardi, 2006, p. 99) between rules, community and the division of labour, to form an identification of a particular activity system. In the Engeströmian model, *Subject* is the individual or individuals participating in an activity. *Tools* can be physical, such as a computer, or abstract, such as language, and directly mediate engagement with the world. *Rules* are the explicit and implicit norms, customs, social conventions and means of doing within context. *The Division of Labour* is the physical or mental use of tool mediation through forms of coordination and collaboration. *Community* is the direct and indirect collection of participants involved with, or affected by, an activity and who share the object of the activity.

There have been 'three generations' (Engeström, 2000, p. 970) of activity theory which themselves represented three different approaches to activity theory analysis. Daniels (2001, p. 89) describes Vygotsky's mediated action model and Leontiev's collective nature of activity as first generation; Engeström's focus on the interrelation between subject and his or her community as second generation; and analysis investigating networking activity systems as third generation.

From drawing on the work of both Engeström and Daniels, it seemed that of the three generations, the second generation model most resonates both with my research questions and also the overarching critical themes of this project. Rather than focus on interrelated activity systems I first wanted to identify, and examine in some detail, individual rather than multiple systems. Drawing on the second generation model mediates analysis of the social and collective features of an individual activity system (Daniels, 2001, p. 89). Such an approach leads to an understanding not just at the micro level of the individual actor and their use of meditational tools, but at the macro-level – that is, the interactions between actor, tools, community, rules and divisions of labour.

Earlier in this chapter I discussed how mediated action, and mediation by tools and artefacts, was central in CHAT. As with CHAT, mediation is also prominent in active theory analysis. The relationship between the components of an activity system has been described as the system's 'mediational structure' (Engeström, 1987b, p. 78). This meditational structure, and tools as mediators between subject and object, is a fundamental principle in activity theory (Kaptelinin & Nardi, 2006, p. 196). Mediation can be seen as where tools have the function to support 'the formulation and exchange of ideas, reflection and meaning-making' (Kahveci, *et al.*, 2008, p. 326). Mediation however, is not solely related to tools:

> There are *multiple mediations* in an activity system. The subject and the object, or the actor and the environment, are mediated by instruments, including symbols and representations of various kinds…The less visible social mediators of activity [are] rules, community, and division of labour. (Engeström, 1999a, p. 66)

Mediation describes the interaction between an actor and the world – in exploring mediation between tool and individual, activity theory recognises the:

> …special status of culturally developed artefacts, considering them as fundamental mediators of purposeful human actions that relate human beings to the immediately present objective world and to human culture and history. (Kaptelinin & Nardi, 2006, p. 71)

Consequently, when considering the relationship between the components of an activity system, it is necessary to examine the meditational role of the components in the system. In this project I am focusing particularly on educational technologies mediating teachers' activities. This focus develops an understanding of how technology mediates an activity, the interrelationship between technological tools as mediators, and the components of the activity system.

Contradictions

The process of examining how technology mediates teachers' activities also reveals the tensions between technology and these activities. Identifying such tensions is essential in revealing 'contradictions' (Engeström, 2010, no page). In activity theory a conflict is the manifestation of contradictions which exist beyond the instance of a single activity but within the context of an activity (Yamagata-Lynch, 2010, p. 2). Contradictions indicate what Engeström (2010, no page) identifies as a 'hampering' of a subject in attaining the object of the activity – contradictions should not merely be balanced, but resolved and moved through to create a qualitatively new system. Analysing the contradictions in an activity system leads to an 'expansive solution' (Engeström, 1999a, p. 66) to the tensions within the system.

Contradictions are historically located (Holland & Reeves, 1996, p. 272). Resolution of contradictions is concerned with moving beyond the present to a 'foreseeable new model' (Engeström, 1999a, p. 67) – as Engeström outlines, the relationship between the histories of activity systems, and the social struggles and dynamics that shape these systems reveal contradictions:

> In activity theory, developmental transformations are seen as attempts to reorganize, or re-mediate, the activity system in order to resolves its pressing inner contradictions. Whilst the primary contradiction between the use value and exchange value of the object does not go away, it evolves and takes the form of specific secondary contradictions as the activity system interacts with other activity systems. The emergence, aggravation and resolution of these secondary contradictions may be regarded as the developmental cycle of the life of the activity system. (Engeström, 1999a, p. 67)

I have focussed on the inner primary contradictions within activity systems, and particularly the technological tools mediating such contradictions. From positioning education and learning as a commodity (see for example, Smyth, *et al*., 2000, pp. 39-40) exploring contradictions in activity systems in terms of exchange value and use value is a powerful lens. After analysing the data for secondary contradictions, it became clear that moving the analysis to the secondary contradictions between activity systems is beyond the scope (and word count) of this project. Consequently, my analysis focuses on the primary contradictions only.

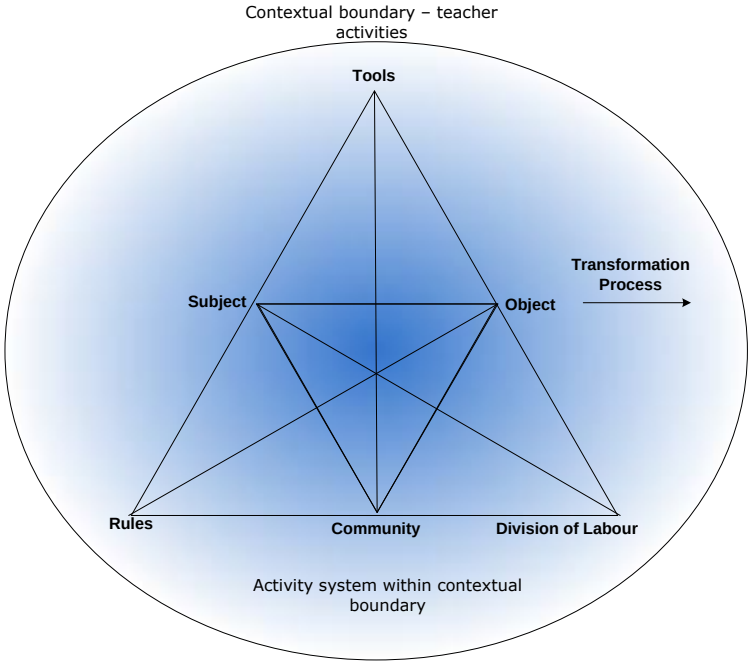

Figure 3.4 Activity system contextual boundary

An important part of using activity theory is classifying the boundaries of activity systems (Yamagata-Lynch, 2007, p. 460). The difficulty with such a complex analysis is identifying what data should be included, and what data left out. Constructing the boundaries for activity systems can be effectively on three planes of analysis – the personal, interpersonal and institutional – which mediate a zooming in and out of the data (Rogoff, 1995, p. 139). I used this approach to focus on the personal plane in terms of individual teachers (the key informants); the interpersonal plane in terms of groups of teachers (the wider teaching body); and the institutional plane in terms of the school. I then used what Yamagata-Lynch (2001, p. 460) describes as a contextual boundary to locate the analysis within the key informants' activities as shown in Figure 3.4 (amended from Yamagata-Lynch 2007, p. 470).

3.4.3 Using the model

My analysis was not a linear process, as the identification of contextual data and activity systems did not neatly follow each other (I have attempted to indicate the cyclical nature of this process in Figure 3.5). Each of the stages of the analysis was interlinked with the previous and following stages, with the 'final' stage of the analysis merely signalling the renewal of the analytical process.

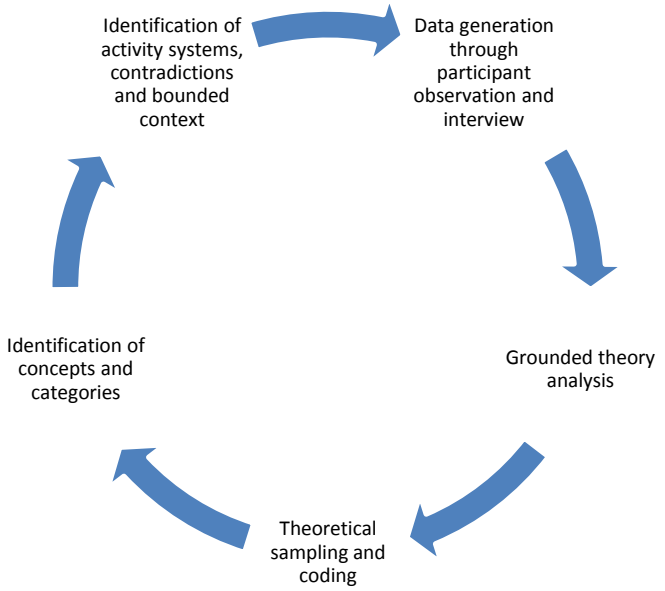

Figure 3.5 Representation of the analytical model

Stage 1 of my analysis used the grounded theory model. I catalogued each interview with a unique label. This label identified who the interview was with, its date and location. I then analysed the data from the interviews and listed discrete concepts which appeared to be the salient foci of the interview - for example, the relationship between educational technology and teachers' isolation. Often this initial coding resulted from identifying conversational topics and variations of focus (Walford, 2001, p. 94). Through the identification of a specific concept such as isolation, I constructed a category of similar phenomena. I drew together concepts relevant to individual teachers and from these constructed a general category for both key informants.

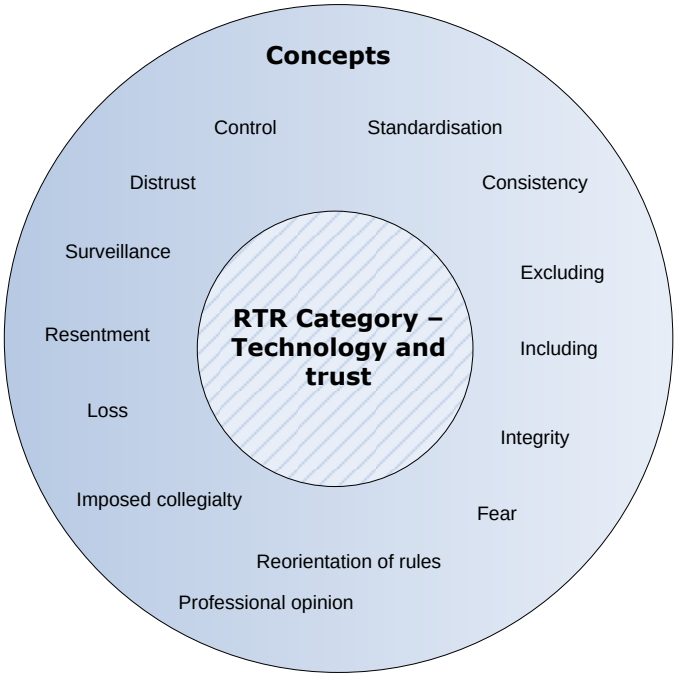

Figure 3.6 Micro-level analysis of concepts and identification of category

The process of identifying concepts and categories had two stages. First I identified the micro-level concepts which appeared to link to a category. These were the concepts specific to either Nicola or David's experiences. As can be seen in Figure 3.6, the outer circle contains the linked concepts, with the inner circle displaying what appears to be the category to which these concepts are aligned.

I then refined this analysis through developing concepts and categories at the macro-level – an example is shown in Table 3.4. These macro-level concepts resonated with more than one of the key informants as these were more generalised concepts which led to an overarching category and which reflected the experiences of a number of teachers at the school. The macro-level analysis emerged through the triangulation of different data sets (whether interview, observation, documents or computer mediated applications), and viewpoints, such as those of teachers other than the key informants, managers, support staff and pupils. The left hand column indicates the macro-level concepts relating to a technology which have emerged from my analysis of the data. The right hand column briefly outlines the analysis from which these refined concepts emerged. These concepts are then grouped together to form the overarching macro-level category into which they appear to fit and which is the title of the category – in this example technology and trust.

MAM Category	Technology and Trust
Concepts	**Analysis**
Truth	MAM positioned as a trustworthy reflection of the school, pupils and teachers. As such, MAM redefines the process of moderation to become outcome driven in terms of efficiency and productivity, rather than a consensus of opinion. Trust becomes located within 'hard' data.
Professional identity	MAM redefines professional identity from one of part of a community of teachers to individuals as competitors. Technology central in mediating the data driven, and performance centred, model of moderation.
Standardisation	Standardisation in product – MAM not concerned with trust of teachers but in fitting the product within standardised metrics. Technology key in defining these metrics – through DDLs for example.
Consistency	MAM identifies standards - technology mediates consistency in those standards. The onus is removed from trusting teachers and put on trusting technology and data.

Table 3.4 Macro-Level identification of concepts and category

Developing activity systems
Questions asked
What are the key activities related to the study that are in the data set?
What is the setting in which these activities are situated?
Who are the subjects of these activities?
What is the shared object of these activities?
Do different subjects participating in the same activity view the activity and the object differently? If yes, why?
What tools, rules, community and division of labour are involved in these activities?
What contradictions are bringing tensions into these activities?
What are the outcomes of these activities?

Table 3.5 Questions developing activity systems from contextual data

I then instigated Stage 2 of my analysis. I examined the coded data through asking myself questions linking the contextual analysis with the process of developing activity systems. The questions I asked are indicated in Table 3.5 (amended from Yamagata-Lynch, 2010, p. 75). Asking these questions identified activities, the subject and object of those activities, and the tools, rules, community and division of labour which supported the activity system. I then used the Engeström triangle model (shown in Figure 3.3) to construct models of the systems for these activities. I identified data which related to the different components of an activity system (tools, subject, object, rules, community and the division of labour) and wrote this on

the activity triangle diagrams. I analysed the data relevant to each activity system to identify which technological tools were prominent in meditating the system. From establishing the prominent technologies, I then re-examined the data to explore teachers' experiences of the roles and consequences of these tools.

Once individual activities and activity systems had been identified (from within the contextual boundary), my analysis entered the final stage of examining the data in terms of possible contradictions in the activity systems. As I discussed earlier in this chapter, in Engeströmian activity theory contradictions in activity systems reveals tensions between different components of that system. The identification of contradictions is elemental to the process of developing models of activity systems (Yamagata-Lynch, 2007, p. 459) and an understanding of – in this case - teachers' activities. The identification of contradictions does not necessarily signify an organisation in technological meltdown. Rather that such an identification might be a positive step toward resolving some of the issues I discussed in Chapter 2. For example, resolving technologically mediated contradictions might lead to an alteration of teaching practice (Murphy & Manzanares, 2008, p. 1063). As Karasavvidis (2009, p. 436) illustrates, exploring the contradictions in activity systems reveals not only teachers' understanding of technology, but also the implications of technological mediation on their practice.

The process used for identifying possible contradictions within activity systems mirrored that of identifying the activity systems themselves. I conducted a process of analysing data to identify conflicts and tensions within an activity system which signified a possible contradiction. For example, I identified data relating to teachers' distrust of technology. From identifying this concept of distrust, I then examined the technology which mediated the system and the relationship between that technological tool and the rest of the system's components. Exploring how a technology mediates an activity, and the relationship between that tool and the components of the activity system, a contradiction can be inferred. Once a possible contradiction was identified, the data was re-analysed to examine which components the contradiction might be between.

I followed the convections in activity theory literature (see for example, Engeström, 1999b; Kahveci, *et al*., 2008; Yamagata-Lynch, 2010) by using a dotted, double-ended arrow symbol on the activity system diagram. This dotted symbol signified that a contradiction existed within an activity system, and delineated which components of that system the contradiction was between (as shown in Figure 3.7).

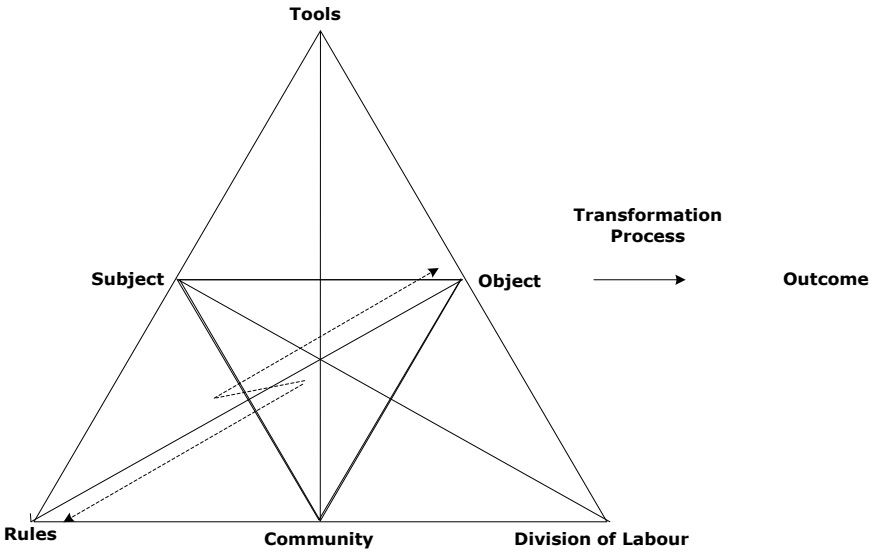

Figure 3.7 Contradiction between rules and object

After I initially identified multiple contradictions, I decided to focus on a single contradiction in each activity system. This is not to say that each system only had a single contradiction; rather that the complexity of analysing multiple contradictions proved to be outside the scope of a lone researcher (see also, Yamagata-Lynch, 2007, p. 453; Murphy and Manzanares, 2008, p. 1064). The act of placing the contradiction symbol in the activity system diagram is an important part of the analytical process. The discussion that underpins my choice to identify a contradiction in the first place, and then to suggest the components the contradiction might be between, is central. It is important to 'present' the diagrams to the reader, and to build up the data in the discussion. The relatively simplistic use of the contradiction symbol is the result of careful and considered analysis.

The final stage of my investigation was to present possible generalisations from my analysis of Nicola and David's experiences of technology. Activity theory analysis cannot be generalized from in what might be considered the traditional sense (Yammagata-Lynch, 2010, p. 32).

However, Yammagata-Lynch (2010, p. 32) - through drawing on the work of Stake (1995) - goes onto to describe the possibility for activity theory analysis to be used to identify general findings within the case being examined. There are 'resonances' between the experiences of the teachers in this study – resonances which are transferable between teachers, between activities and between settings. The model I used for making context specific generalisations established an overview by synthesising the activity theory analysis for each individual teacher, to develop a generalised model of technology mediation for both teachers.

What I present in the following chapters are both tentative findings and a subjective and biased discussion of teachers and technology. My analytical model has afforded an examination of the complex relationships between technology, society and culture. Identifying the context that surrounds teachers' experiences of educational technology is vital if an understanding of such technology is to develop. Similarly, examining technology as a mediating tool between actor and environment; its mediation of teachers' communities; its mediation of formal and informal rules; and mediating the divisions of labour within a school, is a powerful lens. Having discussed in Chapter 2 how technology is socially shaped – my analysis examines the interactions between technological tools, and teachers' activities, so as to explore some of the relationships between teachers and technology.

3.5 Summary of key themes chapter 3

In this chapter I have considered the design and methodology of the research, and given some context to the research setting. Writing narrative portraits of the key informants was a central part of this context – as was my attempt to give Brampton High and Hither Vale a sense of 'thisness'. The opening section of this chapter focussed on presenting an insight as to why the key informants might have experienced educational technology as they did at Brampton High.

I have also discussed how I have carried out the project. In doing so, I have focussed on the rigour of my research model. I have established trustworthiness and explored credibility, transferability, dependability and confirmability. I have positioned the confirmability of the project in terms of good faith and how such how good faith relates to the craftsmanship I have attempted to show in the project. I have written about my reading of ethnography, and I have clearly defined what my reading of ethnography means and what it requires. I have discussed in detail the data generation methodologies I have used. I have established the status of data in the project and the methods of data recording.

I have explored my use of an amended grounded theory coding system and acknowledged the rigorous process of labelling discrete phenomena as concepts, grouping these concepts together as categories, and then identifying how these concepts and categories both define, and are located within, activity systems. I have examined activity theory and discussed how I have struggled (and to an extent resolved) to make it work for me. I have explored what the components of an activity system are, how activity systems sit together, and contradictions in the prevention of object attainment. I have discussed the process I used for my analysis - particularly the movement from data set, to concepts and categories, to systems and contradictions. I have discussed how I have used activity theory within the boundaries of this project and the importance of the contextual boundaries of the analysis itself.

Prelude to the analysis

In the previous chapter I have discussed design, methodologies and analysis. The following three chapters are where the theory is put into practice. To reiterate, my analysis identifies concepts, categories, and activity systems and infers contradictions in those systems. The analysis is of empirical observational and interview data – I include in the text data from interviews, observations, the school's intranet portal, photographs, screen shots and field notes to develop, and position, the context of the setting.

I have focused on four activities – and their activity systems - two for each teacher, and the educational technologies mediating those systems. For Nicola, these are the Module Assessment Meeting (MAM) and Real Time Reporting (RTR); for David, the Performance Management Review (PMR) and the Significant Adult Ambassador (SAA). The technology mediating these activities and systems is in the form of 'hardware' such as Tablet Personal Computer, Liquid Crystal Display Projector and USB data storage device; 'software' such as Read-Only Files, and Microsoft Excel spreadsheets; and 'Internet-intranet-portal systems' such as the Learning Gateway Portal, CMIS and e-portal.

My identification of these activities, systems and tools emerged from the process of data generation, analysis, and reviewing the literature, and which link back to the research questions I discussed in Chapter 1:

- What is it like for teachers to use educational technology?
- Why do teachers use educational technology the way they do?
- What are the consequences of using educational technology?

Exploring these four systems and the tools which mediate them reveals what it is like for Nicola and David to use technology; why they use it the way they do; and some of the consequences of using it. This final question is perhaps most important. For example, the Module Assessment Meeting is just that, a meeting. However, the consequences of this

meeting, and centrally the technology in mediating it, appear to become infused in far more than just the meeting itself - the processes which technology mediate have consequences for the key informants' pedagogy, beliefs, communities, identity, and how they feel they are trusted.

In my literature review I focused on three broad 'landscapes' – technology and pedagogy; technology and society; technology, identity and community. The systems and tools I discuss in the following analysis begin to expose some of the relationships between teachers and technology within these three landscapes. For example, I explore how technology mediates a market-led and performative education system; I interpret how a performative education system engenders efficiency and production to become increasingly prominent; I examine how technology mediates, and represents, as much a 'professionalism' of teachers as any better way of getting things done; I reveal how teachers display an unwilling assimilation of imposed technological change and how this assimilation begins in an almost hopeful principled pragmatism, eventually transforming into a contingent, and realistic, 'matter-of-factness'.

In my analysis I explore what Nicola and David say about their experiences of educational technology so as to paint pictures, which in part, answer my research questions. I examine the context which surrounds a piece of data as much as the data:

> …so as to try to recreate the atmosphere of the event, to portray the feel and mood of it, and to convey the reader into the heart of one of the schools... (Jeffery & Woods, 1998, p. 10)

Central to my analysis is the identification of contradictions in activity systems which can be so great that they can cause a collapse of that system (Kuutti, 1996, p. 34). The focus of my analysis is how this potential for collapse is reflected both in the systems which Nicola and David participate in, and their experiences of such a collapse; perhaps fear, perhaps resentment, perhaps relief.

Finally in this 'catch of breath' is an acknowledgment that my analysis is nuanced by my own assumptions. My analysis is located in my interpretation of the 'facts' as I experience them, no more, no less, - a different researcher might access the same facts and render 'different stories' (see for example, Stronach & Maclure, 1997, p.34) from those I identify. I do not claim

this to be the absolute, irrefutable truth about how the teachers in this study experience technology; merely my interpretation of what appears to be the case.

Chapter 4: Positioning Nicola Howard

Synopsis of Chapter 4

In this chapter, I identify and explore two of Nicola's activities - the Module Assessment Meeting (MAM) and Real Time Reporting (RTR). In the first section, I describe the processes involved in MAM, identify some of the rules which support it, and recognise the prominent technologies which act as mediating tools. I present part of the data set relating to MAM, examine some of the claims Nicola made, and triangulate these claims with my own observations and remarks from other informants. I establish concepts which emerged from my grounded theory analysis of the MAM data, and develop the overarching category of 'technology and trust'.

I then focus on the activity theory analysis. Using concepts and categories, I develop a model of the MAM activity system through relating data to the components (tools, subject, object, rules, community and division of labour) of the system. I examine the relationship between the tools used in MAM – the Tablet Personal Computer (TPC), Read Only File (ROF) and Liquid Crystal Display Projector (LCDP) - and the rules of the activity. From this process, I suggest the presence of a contradiction between tools and rules which prevents Nicola form attaining her object.

In the second section, I analyse the RTR data. I identify concepts in the RTR data set and from these develop the category of 'technology and truth'. I establish my activity theory analysis of RTR and identify the RTR activity system. I examine the school's Internet Portal (IP) and Short Message Service (SMS) 'texting,' in mediating the RTR system. I then discuss how these tools mediate communication between community members. From investigating this mediation, I suggest a contradiction in the RTR system between tools and the RTR community.

4.1 Module assessment meeting

The Module Assessment Meeting (MAM) was first introduced in the 2008-2009 academic year. The MAM activity culminated in a fortnightly 45-minute meeting where faculty staff members discussed the 'moderation' of Business and Technology Education Council (BTEC) coursework. BTEC moderation was where the coursework modules by which students were assessed were checked for consistency between the grades awarded – MAM was positioned by Brampton's SLT as integral to the school's internal quality control process. I was able to interview Rashid, a member of SLT, who described the thinking behind MAM:

> *A.C – I'm interested in what is he thinking behind MAM and the movement to ROF data storage?*
>
> *Rashid – Well ROF is easy. We were concerned that the data which we were being given to work with was easily accessible to a wide range of staff. This meant that keeping control of the data was a real worry, if we were presenting data to OfSTED, HMI, Governors, Parents then we must be sure that it is trustworthy. When we consulted with SERCO [the company providing the school's intranet system] they told us that one of the advantages of their system was that levels of access could be tailored.*
>
> *A.C. – So different people have different levels of access.*
>
> *Rashid – Yeah; being able to set up protocols for access means that we can be sure of the data. We can see who has accessed each file and when. It's part of the moderation process as well, it's also part of the need for consistency.*
>
> *A.C So MAM is about consistency of moderation across the school and using ROF is also about consistency?*
>
> *Rashid – Yes. There isn't any sort of deep agenda with this idea. It's just that we feel the school needs to be more consistent in lots of ways and this is one way of achieving that by using the technology we have.*
>
> *A.C – How was data stored before?*
>
> *Rashid – It was RAM which caused lots of problems. It was just impossible to keep 'tabs' on who was accessing what and when. Of course, with quite a lot of work, we could find out who amended what file and when but it took so much time. And because it took so long by the time we got to the person and asked them what had gone on it was too late – that file had been amended so that the incorrect data was then embedded in the dataset.*
>
> (Rashid, SLT – Interview, SLT office, non-contact period)

Prior to MAM, teachers undertook an audit of their classes' coursework through the marking of individual pieces of work. The data from this marking process was entered onto spreadsheets

on the school's intranet system – as can be seen in Image 4.1 - (I describe Brampton's intranet system Learning Gateway in more detail in the RTR section of this chapter).

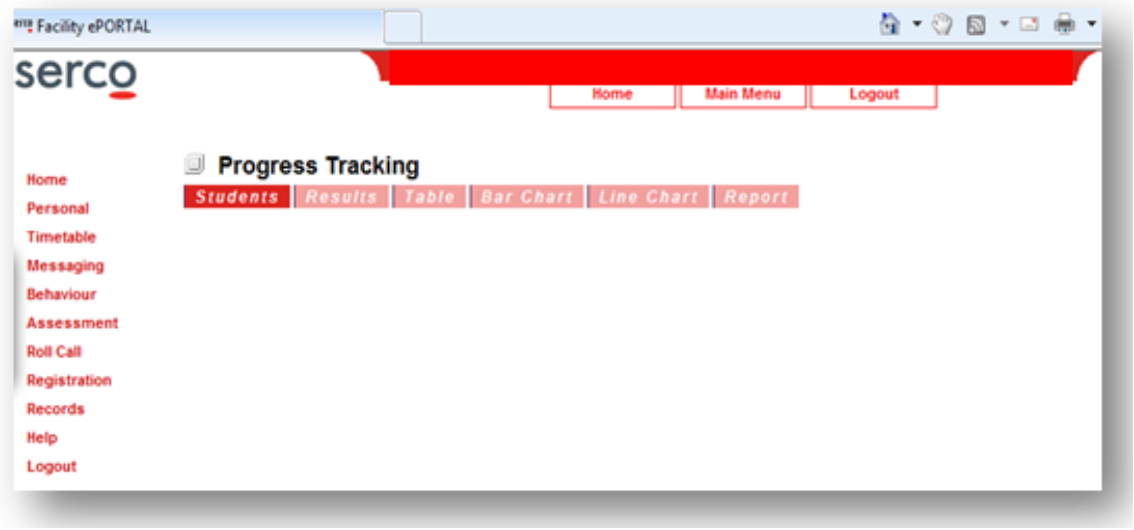

Image 4.1 MAM data entry page

This data was examined, discussed and if need be amended at the MAM. Once the teachers in a faculty agreed on a moderated mark, the process was repeated through the course of the academic year until all BTEC units had been moderated. MAM meetings were held between September and June - at the beginning of July a sample of students' work representing different grading bands was sent to the BTEC examination board for external moderation. If there was a discrepancy between the schools marking, and that of the examination board, then potentially the whole sample (almost 2,600 individual pieces of work) could be recalled to the school for remarking. The data used for MAM was entered onto Microsoft Excel spreadsheets prior to the meetings and which were accessed via the progress tracking tab on the Learning Gateway. MAM data, like all data at Brampton was managed by the Common Management Information Service (CMIS) system provided by Serco Learning – the CMIS log-in page can be seen in Image 4.2. CMIS is an integrated application framework which mediates the planning, regulation and organisation of data.

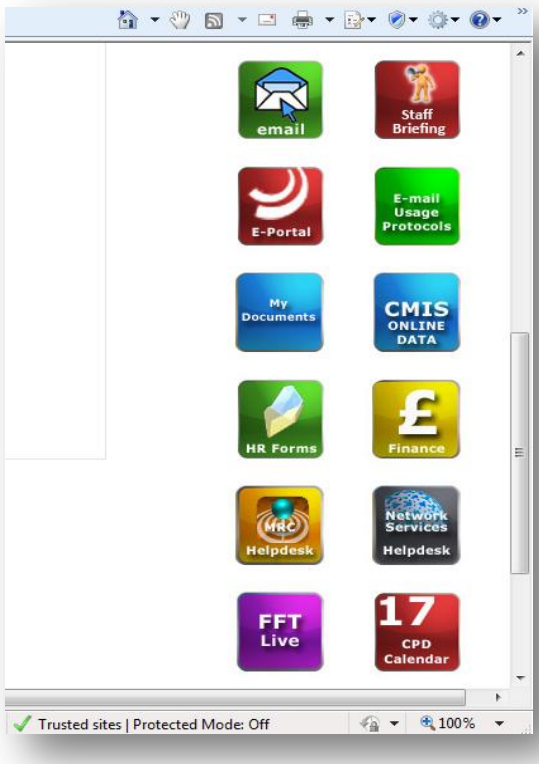

Image 4.2 CMIS log-in page

The CMIS spreadsheets had a number of embedded macros (macros are rules or patterns which link input data with an output sequence), which converted the module score data into an overall grade for each student in a particular class. CMIS macros then mediated a comparison between the actual scores attained by students, and the predictive scores generated from Midyis, Yellis and FFT to produce an overall 'residual' score. This process of comparison was then continued within faculties to compare students with students and classes with classes, and then mapped across the entire school to compare the residual scores of students in different faculties.

Three key tools were prominent in MAM, the Tablet Personal Computer (TPC), the Read-Only File (ROF) and the Liquid Crystal Display Projector (LCDP). A TPC is a portable personal computer equipped with an interactive touch screen input device. A TPC usually has a 12" screen rather than the 14.1" screen common on laptop computers, however unlike a laptop a TPC can function without a hardware keyboard as the touch screen can present a 'virtual' substitute. The TPC model used at Brampton High featured a pivoting screen, which could be positioned flat over the keyboard. When the screen was in this position the machine was in

'tablet' mode and the virtual keyboard could be activated by physically touching the screen. Also when in tablet mode, as shown in Image 4.3, a program called OneNote could be used to mediate a transformation of handwritten text or speech into word-processed text. Once text was entered into OneNote, students could use the internal email to send work to teachers to be marked.

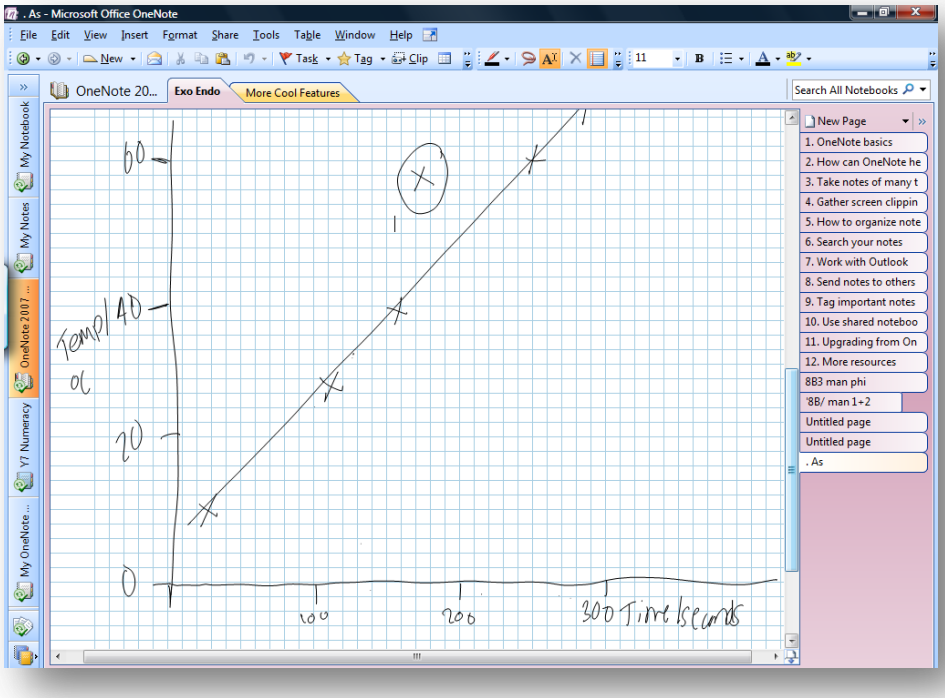

Image 4.3 OneNote

TPCs are 'wireless enabled' allowing Internet connection to any wireless network and are 'pen-based' machines with the tablet pen providing an interface between user and machine. TPCs can run Microsoft Vista and Windows 7 with the machines at Brampton using Vista. Both teachers and students used Toshiba Portėgė machines – as can be seen in Image 4.4 - with an Intel (R) Core ™ Duo Processor and 4GB RAM. The TPC was powered by a Toshiba Li-Ion single battery pack giving 4 hours use when fully charged by a Power Supply Unit (PSU). A single battery was specified for Brampton's TPCs - the space required for a double battery (which gave 8 hours battery life) was unavailable due to the CD drive installed in the machine.

Image 4.4 Toshiba Portėgė TPC

A LCDP was part of a system in each of the classrooms at Brampton High – Image 4.5 Shows a typical layout - , which linked the projector to a TPC or PC and an IWB. When connected to the TPC, the LCDP could be used to display video, images or computer data on an IWB. The LCDP was connected to the TPC via a wired medium such as a Universal Serial Bus (USB) or wirelessly via a Bluetooth connection. Once connected, the LCDP projected images from the TPC onto the IWB and teachers and students could interact with the IWB using either a pen or the IWB Touch Screen facility. IWB screens can vary in size, from between 78" to 95" with the ones at Brampton High being manufactured by Promethean from the company's ActivBoard 300 range.

CMIS mediated communication between different parts of Brampton's network. Data entered, for example via the MAM tab, was also available for other applications and could be cross referenced with attendance and punctuality data. Due to its importance, MAM data was stored as ROF which enabled different levels of access to editing these files. Central to ROF data storage is the level of security provided - if an unauthorised attempt is made to edit ROF data, a copy file is created to which the changes are made rather than the original ROF. ROF files can be set up with varying levels of sophistication. For example, a specific date can be applied

to a file after which that file becomes ROF. Similarly, files can cease to be ROF when associated with different levels of user access. At Brampton, files might be ROF for teachers and faculty heads, but a writable Random-Access Memory (RAM) file - which allowed editing without any restrictions - for members of SLT.

Image 4.5 Typical LCDP and IWB setup

Teachers were given an access window of about 10 days to enter data onto MAM spreadsheets via the TPC. The process whereby the BTEC Excel spreadsheets moved from RAM to ROF was executed when the teacher entered their class scores onto the Learning Gateway. During this process a message was displayed via a 'dialogue box' informing the teacher that the data would be saved as a ROF file – a dialogue box is a type of window that mediates reciprocal communication or 'dialogue' between a computer and its user so as to specify as command in response to an alert. The teacher was asked to confirm that this command has been accepted, and when the file was saved it was no longer RAM. If the spreadsheet was accessed after this time, a further dialogue box informed the teacher that the file was 'locked for editing' and that any changes would be saved to a copy file and not the original. There was a set protocol for making amendments to ROF after the data has been submitted, if for example a mistake had been made or a grade needed to be altered. The teacher involved met with a member of the

faculty's leadership team to discuss the amendment. Once the inaccurate entry had been identified, the school's Network Services (NS) team was informed and the ROF file was temporarily amended to a RAM format whilst the amendment was made. Saving the data subsequent to the amendment reformatted the data as ROF.

Central to MAM was it being a forum for the public presentation of BTEC module data. During the MAM, each teacher presented to the rest of the faculty the module scores and residual scores for the groups that they taught. Teachers connected their TPC to the LCDP and projected their MAM spreadsheets containing the coursework data. After the presentation there was a discussion about the performance of individual students and whole classes. The LCDP mediated an 'open' forum where teachers were able to examine the performance data of their colleagues' classes.

I was able to observe two MAMs in the technology faculty, the first of which was the introductory meeting using the MAM model. There appeared to have been an informal atmosphere, there was laughing and joking amongst colleagues and some confusion as to whether the meeting was even 'directed time' (directed time being an after school meeting or event which is counted in teachers' loadings and therefore mandatory to attend). This confusion was soon dispelled as it was made quite clear by Shazad Khan - the technology department Head of Faculty (HOF) - that this was not an optional meeting, and that MAMs were directed time. What follows is an exchange between Shazad and a teacher, Marilyn, at this meeting:

> *Shazad - This is part of the new structure - moderation isn't like it used to be.*
>
> *Marilyn – Another change then.*
>
> *Shazad – Yes, this is an important one. Moderation isn't ad hoc anymore. This is part of the whole consistency thing. We don't just moderate when we think it's appropriate. There's a whole new system of moderation which sets out where and when we moderate. Everything is done on-line through e-portal. I asked for everyone to bring their laptops and most of you have.*
>
> *Marilyn – Can I ask then, we always entered our scores onto S drive* [shared drive on the intranet] *anyway so what's the difference?*
>
> *Shazad – This system puts all the data, from all the subjects, together.*
>
> *Marilyn – In one location?*

Shazad – Yes, it's all part of getting everything on CMIS so it can be analysed.

Marilyn – Don't you mean being checked up on? (Sahzad does not answer this question and moves onto the next point in the meeting agenda).

(Shazad, HOF, Technology and Marilyn, Technology teacher - Field note, KS3 Technology classroom, after school)

There were some conversations by teachers about "doing a presentation" but the mood was lighthearted. However, after Shazad had gone through the model for the MAM there appeared a change in the mood. Two teachers in particular voiced their unhappiness regarding the format of the meeting.

One teacher, Philip, asked "what's the point" of using the LCDP in the meeting, another, Gail, was confused as to how data would be accessed once it was stored as ROF:

Gail – So all the moderation data is ROF?

Shazad – Yes.

Gail – So if I want to change something you're telling me I have to email you so that you can clear me to get access?

Shazad – Yes, that's how I understand it.

Gail – So I can't be trusted?

Shazad – That's no it at all. There's just this worry that the data has to be reliable. They [SLT] *just want to have more of a handle on whose accessing what.*

Gail – It might seem like that to them, to me it's like I can't be trusted.

(Shazad, Technology HOF and Gail, Technology teacher - Field note, KS3 Technology classroom, after school)

William talked about the use of technology as nothing but a tool for mediating entrenched power relationships:

William – It seems to me that this is all about an 'us and them' culture. Moderation isn't about the kid's grades it's about the Government, and I don't blame the management, it's about the Government's agenda for control of teachers. The increase in technology in MAM is a symptom of the power divisions between workers and managers.

(William, Technology teacher – Field note, KS3 Technology classroom, after school)

Teachers then went through the process of presenting their data. Two teachers were initially unable to present because of technical issues with their TPCs. This was resolved by the HOF – the teachers emailed him their MAM spreadsheets, he then used the USB port to attach his TPC to the LCDP and projected the spreadsheets from his machine. There was a contrast in teachers' presentation styles. Some teachers confidently presented their data and used contextual information (for example, regarding attendance or behavior) to support their presentation. Others appeared uncomfortable, Steve was particularly unhappy about the "pointless" presentation:

> *Steve - I don't see why I have to 'present' to everyone the scores I've given. It's pointless. I can see that everything needs to be put on e-portal at some point. But what a waste of time making us stand up and talk through what we've done. It's like just because we've got whiteboards* [IWB] *and projectors we're being made to use them just because they're there. It's pointless.*
>
> (Steve, Technology teacher - Field note, KS3 Technology classroom, after school)

There were a number of comments that the meeting no longer appeared to be related to moderation i.e. a professional discussion regarding coursework, and more reflected a business model of presenting indicators or production, efficiency and profit:

I also attended the second MAM in the technology faculty, where there was a stark contrast to the previous meeting:

> *The tables had been left as they were for lessons – each table faced the front of the classroom with two chairs. In the previous moderation meetings the tables had been moved to form one large table in the middle of the room around which everyone sat. This was not the case in MAM meetings. Nicola sat next to Khuram, but all the others teachers sat on their own. Shazad sat behind the 'teacher's desk' at the front of the class. Previous to MAM he sat with his colleagues around the central work table.*
>
> (Technology Faculty MAM – Observation, KS3 Technology classroom, after school)

The laughter had gone and there were more staff members who appeared to be uncomfortable with MAM. Khuram highlighted two concerns regarding MAM. First, the use of ROF for data management, and second the LCDP presentation of this data to the faculty. Several other teachers (including Nicola) supported his concerns:

> *Khuram - I'm really not happy with the structure of these meetings. I can see why the data needs to be safe and accurate but it's the way it's been handled.*

SLT should've highlighted that there was a problem with data corruption and that we all need to be more careful. But I don't think I've ever messed up entering moderation data because we've always done it as team before. This system puts everyone on their own.

And then there's the projector thing. I'm sorry but that's ridiculous. All it means is that there's this pressure in this meeting when we should be a team working together. Is SLT happy that I'm thinking that the real purpose of this meeting is to compare my marks with someone else's and then judge who the better teacher is? When it's used like this the computer's become just another way of checking up on me.

(Khuram, Technology teacher - Field note, KS3 Technology classroom, after school*)*

The MAM data reflected a recurring and prominent theme - that of MAM and trust. The initial interview we had regarding MAM centered on Nicola wanting to give the new system a chance, to see what it was like in action before passing comment. Indeed, Nicola was dismissive of what she called 'dinosaur' teachers who she suggested did not attempt to integrate a new initiative or piece of technology into their practice before dismissing it. Nonetheless she did have some concerns:

A.C - You don't have a problem with using something like CMIS

Nicola - The whole idea of getting some sort of consistency seems like a good one. It's just that what do they mean by consistency of moderation? Kate [a colleague of Nicola's] *and I are always about a grade out when we moderate our marks.*

A.C - what happens then?

Nicola - I'm a grade higher than she is, we have a good laugh about it and the truth is that the actual mark should be somewhere in between the two and that's what we give.

A.C - So what about the e-portal driven system?

Nicola - I'm a bit concerned that if moderation becomes more hard data and technology driven, then these sorts of conversations will go.

(Nicola – Interview, KS3 Technology classroom, lunchtime)

However, after only one MAM Nicola's opinion had altered and she was particularly critical of data being stored as ROF. Nicola's claim was that ROF was not necessarily an indication of good technological housekeeping. Rather, that ROF suggests at best a lack of competence in those who accessed the file, and at worst a distrust of their motives:

I saw Nicola walking down the corridor - she appeared to be tense and her expression was one of anger. Before I could ask her how she was, a colleague

of Nicola's, Sam (a technology teacher), had shouted Nicola's name. There followed an animated conversation:

Sam – You been to the moderation meeting?

Nicola – Yep and I'm pissed off about it.

Sam – What bit!

Nicola – Most of it really. No that's not fair as I agree that we need more consistency but at what cost.

Sam – What about the data access restrictions?

Nicola - I can't believe all the MAM data is ROF. What does that say about me as a teacher, my integrity?

(Nicola and Sam, Technology teacher - Field note, KS4 corridor, after school)

Nicola was confused as to the motives which underpinned the use of ROF. Nicola's uncertainty was shared by a number of teachers I spoke with as they also could not understand why MAM data was stored as ROF. Previously to MAM, moderation data was RAM as this gave the opportunity for teachers to update their moderation whenever was appropriate. As Shelia commented, storing data as RAM indicated trust in the professionalism of those able to access the data:

Shelia – It's all about power really, about those that can access the data and those that can't. I can see that there's got to be some level of security and that's fine. But surely all the teaching staff should have equal levels of access with regard to amending their own data? This is a way of using technology to keep the power with a certain few in the school – regardless of whether that's the best thing or not.

(Shelia, Languages teacher - Interview, KS4 classroom, before school)

Shelia's comments were shared by Nicola who was concerned about the underlying message of the ROF data storage:

A,C – Has there been data problems, you know, data going missing or being corrupted?

Nicola - I don't know of an occasion when the moderation data has been accidentally erased, or files corrupted, it just hasn't happened in our department. So why change the system now?

A.C. – What about in other departments?

Nicola – I talk to a lot of people and it hasn't been mentioned. I suppose that people might want to keep any problems quiet as cock-ups might paint those

teachers in a pretty poor light. But there are always staff who are ready to 'spill the beans' on cock-ups and data seems pretty secure here.

(Nicola - Field note, KS3 staff base, break)

Nicola spoke about how using ROF impacted on her 'integrity as a teacher'. A number of other teachers supported Nicola's position, with Grant suggesting that the use of ROF appeared to fundamentally undermine the management's trust in teachers.

Grant - So it's OK for SLT to be able to access the data but not me? I don't need to be able to edit anyone else's records but I should be able to get to mine. This whole 'locked-for-editing' process is crazy – it takes so much time and everyone makes mistakes. But the main thing is that I just feel they [SLT] *don't trust me.*

(Grant, Science teacher - Field note, KS3 staff base, break)

The use of ROF in MAM resonated with what has been described as a 'low trust society' (Troman, 2000, p. 331). In such a society in schools, the separation between managers and teachers has become accentuated by a climate of new managerialism, a climate which resonated with the concerns of some teachers at Brampton regarding the storage of data as ROF. There was a sense of disappointment when teachers reflected on what the implications of ROF might be. This disappointment was shared by both teachers and faculty leaders - one HOF, Sammy, spoke of her frustration that the use of ROF had damaged the relationship between herself and her team:

Sammy - The culture that's here now, where we are competitors and the kids are customers, is putting a lot of strain on friendships and relationships. Moderation has turned into a thing that's about teacher's performance as much as coming to an agreement about a mark. I hate it. I hate how the computer, and data, has become so central that everything else is going. It's putting strain on long term friendships I have.

(Sammy, HOF, Field note, KS4 staff base, after school)

Nicola did not claim that the 'backing up' of data was not a prudent precaution, rather that there was a subtext contained within the use of ROF in MAM, what follows is a conversation between Nicola, and her colleague Emma, in the Technology faculty prep (preparation) room:

Nicola - MAM has been really divisive. Instead of being a team we're set up to compete against each other. As soon as one class is compared with another you're comparing teacher with teacher.

Emma- It's less like moderation and more like quality control but with an undercurrent. We're being set up as competitors…

Nicola – The way it's been set up, well, I have this feeling about how I've done in comparison with so and so.

Emma – Yeah, but it's all about the data, the data in the spread sheet is becoming the most important thing.

Nicola - The MAM spread sheet is like a metaphor for the school. I mean it's read-only what message does that give? Is one of us going to go in and sabotage it? Or amend it and change bad scores to good ones!

(Nicola and Emma, Technology teacher - Field note, KS3 technology prep room, break)

Nicola experienced a sense of loss, resentment and even fear through what she considered to be an attack on trust in teachers. Nicola's role as an YLL caused her to get involved in potentially dangerous situations (students used weapons in fights during the time I was researching at the school) - her claim was that trust was important not just in relation to data but that trust and an erosion of trust transferred from one context to another:

A.C – What about trust? Do you feel trusted?

Nicola - Trust is so important in this job. I can't see how keeping data so that only SLT can edit it indicates trust in teachers.

A.C – And not being trusted with data is part of you not feeling trusted in other situations?

Nicola – Yes. If I'm not trusted in one setting then that sort of transfers to others. Am I going to intervene in a situation when kids are fighting with the possible consequence that I get a complaint against me? Will I be trusted when it's my word against someone else's?

A.C. – And the computer, and all the data, and how that data is stored is such a big part of your job that not being trusted with those things means that you feel you're not trusted at all?

Nicola – Yes, I think that's it.

(Nicola – Interview, KS4 staff room, lunch)

Nicola talked about resentment between teachers and management, and how ROF mediated the conditions for this resentment. Nicola claimed that the formal and informal rules which she felt were part of her teacher identity were no longer so:

A,C – Are you saying that the rules that dictate what you do, that are part of your identity as a teacher, are being challenged?

Nicola – Absolutely! When I try to add some MAM data and I see the 'locked for editing' box, I feel let down. I suppose that technology, which helps me, can also be set up to really undermine what I think being a teacher is all about.

A.C – What do you mean 'let down'?

Nicola – Well, I've got some really fundamental beliefs about teaching. Teachers are part of a community – just like the importance of trust and relationships with the kids, the same are true of this community. The more technical everything becomes, the more 'e' based, the more I feel that who I am, and the values I have, are less and less important. And that's like having my heart ripped out.

(Nicola – Interview, KS4 staff room, lunch)

There seemed to be a consensus amongst teachers that I spoke to about this 'reorientation' of rules through MAM and the use of ROF. I observed teachers being distressed due to the requirements of MAM, particularly one teacher, Mike, who had made a mistake with a result entry and was upset about the process of amending his mistake. For Mike, the process of having to inform his HOF, who then had to contact NS to give access to amended ROF data, was representative of a complete lack of trust in him to make the amendment himself:

Mike – I feel so pissed off about this [indicates toward the data entry screen on his laptop] *I've got to email Miriam [*Mike's HOF*] so that she can get me access to the data so I can amend it. I haven't even made a mistake. A kid was away and missed a test and she's done the test now and I just want to put the score in.*

A.C – What would you have done previously?

Mike – I would've logged on and done it myself.

A.C – So what's the problem with this? Isn't SLT just trying to keep all the data at the same level of security?

Mike – Yes they might be doing that, but this whole thing of the kid missing the test, and the procedure for entering the data, has made what should've been a two minute job into on that could take days.

A.C. Why?

Mike – Well for instance I know that Miriam is out today on a course. So I won't be able to even begin to get this done 'till tomorrow now. And that's even before going through the process of emailing access.

(Mike, English teacher – Interview, KS3 class room, after school)

Both Mike and Nicola maintained that MAM, and the technology which mediated MAM, was designed to ensure conforming to the MAM moderation model. Consequently MAM affected what Nicola considered to be some key rules:

Nicola - The way MAM is set up, well the whole thing is like a stick to make sure that the [moderation] *policy is followed.*

(Nicola - Field note, KS3 staff room, break)

Nicola also discussed an example of the stress she experienced when she participated in MAM. Nicola did not consider MAM as moderation at all, certainly not in relation to the model previous to MAM which was an inclusive process where teachers worked together for a common goal:

> *A.C - So the meeting didn't go well then?*
>
> *Nicola – No I don't think so.*
>
> *A.C - Why?*
>
> *Nicola - I feel so sorry for people when they have to stand at the front and defend poor residuals. It's like something out of the apprentice* [the apprentice being a TV program where business people are set tasks which if failed results in a contestant being 'fired' from the show]. *MAM doesn't lend itself to people working together because ultimately we're all competitors with each other.*
>
> *A.C – Did you stand up?*
>
> *Nicola – Yeah I did and I hated it. I did it so there was some sort of solidarity for the others. Shazad has been put in a crap position. I'm sure we'll do it a couple more times and then 'forget' and it will die a death.*
>
> *A.C – But until then?*
>
> *Nicola – We do it and I feel crap about it.*
>
> (Nicola – Interview, KS4 staff room, lunch)

To an extent, Nicola's position was confirmed through my own observations of moderation previous to MAM:

> *From the interactions between the teachers in the room it seemed that there was a community rather than individual teachers having to justify themselves to the collective. All the teachers in a faculty sat around tables pulled together with examples of moderated work in the middle along with paper score sheets. The atmosphere appeared light-hearted yet professional, high, medium and low band pieces of work were identified, moderated and used as the exemplar sample for external moderation. There was an open-forum for conversation where ownership was taken for individual pieces of students' work by the faculty as a whole, and there appeared a distinct sense of community in the moderation process.*
>
> *The most striking thing about moderation was the atmosphere in the room. Although it was 6.20 on a Thursday evening there were still 8 members of the faculty present. In the middle of the table were a number of plates containing the remnants of cakes, fruit and biscuits which had been provided by the HOF. On an adjacent table were examples of students' work and the moderation sheets which would be sent to the examination board. The process was very much a team one, with clear divisions of labour.*
>
> *One teacher was in charge of the paper copies of the moderation sheets and another completed the back-up version of entering scores into an Excel*

spreadsheet. The teacher with the paper copies of the moderation sheets would read out a name of a student and the scores that student achieved for each of the modules. There then came a chorus of 'whohoos' from the staff with the differences in intonation signifying if each teacher was in agreement with the grades given. In most cases there was a concurrence in intonation and the score was agreed.

If however even one 'whohoo' was different from the others, then that students' work was removed from the sample and re-assessed by the group as a whole. When a consensus was agreed the revised score was entered into the spreadsheets. The process was interjected by light heated comments and everyone involved, despite the time, seemed to be engaged with and even enjoying what they were doing.

(Science faculty moderation – Observation, KS4 technology room, after school)

The effect of MAM on teachers and their communities resonates with the increase in 'imposed collegiality' (Little & McLaughlin 1993, p. 75). Nicola discussed the divisive effect of MAM, and that the associated imposed collegiality appeared to signal an erosion of a common community. Nicola was also disappointed in the way the MAM system was introduced by the management:

Nicola - I think if there had been some sort of consultation about MAM and ROF I might have felt better. It's just been badly handled by the management. If they'd have said, "there are issues about data being corrupted" then that would have given some sort of reason for using ROF. But that didn't happen.

A.C – So you think that it's more a case of poor communication than anything else.

Nicola – Yeah, at least I hope so. It's just so easy to think that there is some other agenda.

(Nicola – Interview, KS4 technology room, after school)

In light of Nicola's remarks I re-approached Rashid and asked him if the SLT was happy with the way MAM had been introduced:

Rashid – No in hindsight it's been poorly handled. This has been partly my responsibility. What I should've done is call a full staff meeting to go over what was going to happen. I did send out an explanatory email but that wasn't enough.

A.C – What's been the main problem?

Rashid – It's this thing about trust which keeps coming up. People are saying to me that just going to different access levels seemed to be calling into question how trustworthy people are. That was never the idea. What I should've done is get some teachers together and set up a working party. I just didn't even think for a moment people would see like that. I thought that

they would just be a bit more careful when they entered data and those teachers who kept having data entry issues could be identified and supported.

A.C - So it's put the process back then?

Rashid – I don't care about the time frame, it's the damage that's been done to how people feel they are trusted. Like I say that was never an issue. SLT trust the staff.

(Rashid, SLT – Interview, SLT office, after school)

The link between the imposed collegiality of MAM and positioning schools as 'professional communities' (Hargreaves, 1994a, p. 148), is reflected in the various effects of such collegiality. Nicola claimed that rather than distrusting teachers, the previous moderation system was built on a trust in teachers' dialogue about their professional opinions (a position supported by my observations of these meetings). Nicola maintained that MAM did not follow this model, and she was adamant that a symptom of the lack of trust which was part of MAM was reflected in data being ROF.

There is a difference between communities based on professional corporate relationships and those based on what Hargreaves (1994, p. 74) calls 'personal ties'. Nicola suggested that MAM was concerned with presenting a corporate professional image of teachers working together as professionals rather than one based on personal ties between colleagues. In doing so however, the MAM model undermined the personal ties which acted, as Nicola put it, as the "cement" which held the school together. Nicola claimed that rather than MAM being an attempt to improve a system of moderation, it was a symptom of management control and she was angry and resentful:

Nicola - MAM isn't moderation at all. This is another form of bloody performance management. Before moderation was actually fun, it brought the faculty together and we worked in a really supportive way. If there was some disagreement we discussed it. There was no inference that someone might be negligent in his or her work.

A.C – So moderation now is as much about moderating your work as the kids?

Nicola – That's how it feels. The data, and the protocols for entering data, and the computers are all part of how I feel.

A.C – Why the computers?

Nicola – Well before CMIS, e-portal wasn't as sophisticated so we could use our own judgment. But as e-portal had become more sophisticated we've become deskilled, or at least our judgment is given less weight than 'data'.

A.C – So as the technology gets more sophisticated, your skills become less sophisticated?

Nicola – Yes.

(Nicola – Interview, KS4 technology room, after school)

What Nicola suggested was that MAM and ROF indicated a performative culture based on control. Indeed, control appeared to be a sub-text of the MAM meetings I observed. MAM data was ostensibly about the performance of students; however for Nicola implicit in MAM was that this data represented the performance of teachers:

Nicola - As soon as MAM turns into a comparison of teachers' effectiveness rather than a comparison of teachers' grades there is a big problem. And then on top of this the data is 'locked away' as ROF and this makes it even worse.

A.C Is that how you see it – data is locked away?

Nicola – If I think about it then no because we can always access it. It's just a different system for accessing data. But my gut feeling is the same. The data we used to generate on the kids for their scores has now become a way of scoring us.

(Nicola – Interview, KS4 technology room, after school)

Nicola's suggestion ROF and MAM were tools of control, resonates with Foucault's work on the 'Panopiticon' (1991, p. 195) where technology mediates control and surveillance. Nicola's concern was that technology mediated an increasing prevalence of surveillance in the school (see also Selwyn, 2010b, p. 99). That is, schools have technology such as Closed Circuit Television (CCTV) as omnipresent in both the exterior and interior fabric of their buildings – Brampton High has CCTV cameras in every classroom, and more than one in every corridor, cafeteria and assembly hall. Outside, the KS3 and KS4 buildings have over 20 CCTV cameras respectively on each site. The use of overt surveillance in the school has become increasingly part of teachers, and students, activities as reflected in this observation of Terri:

I was coming out of laboratory after the first lesson of the day. This is a busy time as all of Year 8 and 9 students change lessons at the same time. Consequently, the corridors are full of students, teachers and support staff all making their way to their next lesson. About 10m down the corridor I saw two boys deliberately bump into each other.

What followed was what seemed to start out as a 'play fight' but which then moved into something more serious. The two boys started to wrestle each other, which quickly escalated into punches and kicks. The two boys fell to the ground. I started to make my way over to intervene, before I could do so, the teacher working in the classroom outside which the incident was taking place

emerged from the room. She was confronted by the two boys fighting, and an expanding group of students watching what was happening.

The teacher, Terri, decided to intervene by pulling one of the boys off the other student by his jumper. At this point there was a crowd of about 20 students watching, shouting and chanting, and about three staff other than Teri [including me] *within 1-2m of the incident. The boy Terri pulled immediately turned to Terri and started to shout at her – he accused her of 'gripping me up'* [a term student's use in the school for what they consider as excessive shows of force by members of staff toward students]. *Terri responded by very calmly pointing to the two CCTV cameras which would have recorded he incident. She told the student that her actions were completely justified and that the cameras would have recorded what had happened. With that the student immediately retracted the accusation and apologised to Terri. Terri's use of the CCTV seemed to diffuse the situation.*

(Terri, Science teacher – Observation, KS3 corridor, morning)

Surveillance and control can result in 'an intensification and ramification of power' (Foucault, 1991, p. 198) which appeared particularly prevalent when I talked with one of the HOFs Helen - for her the use of LCDP in MAM situated teachers as "inmates" of a controlled and controlling environment. Helen felt having to present her MAM data publicly rendered her vulnerable. She did not find the process at all supportive and the technology mediating MAM only reinforced her concerns about being controlled and that she was under surveillance:

A.C - You talk about being an inmate, what do you mean?

Helen – Well just look [we are on break duty in the cafeteria] *at all the cameras. There're three just in here. The kids are used to them, you see when something kicks off they put their hoods up so they're more difficult to identify. You can tell if something is going to happen because they all put their hoods up.*

A.C - Don't the cameras help?

Helen – They do help in identification, but obviously the incident hasn't been stopped by their presence. What I mean is that the school doesn't seem to be about learning. Well it is on the surface but the CCTV isn't about learning is it? It's about control.

A.C – So that's the thing about being an inmate?

Helen – I know I'm being watched all the time I'm here. The only place without CCTV is in the toilets. What sort of working conditions is that? It's like a prison, or a shopping center, where ever you go and whatever you do its being recorded.

(Helen, HOF – Interview, KS4 office, lunch)

Control and surveillance were also prevalent when Nicola talked about the public presentation of data in MAM:

Nicola - Having to present our MAM data to the rest of the department was really strange. It was like this whole public spectacle of the grades being projected large ready for everyone to see. It's not that the pressure of sharing marks was any different from the moderation we did before. It's just that because I was using the projector it just felt different.

(Nicola – Interview, KS3 class room, after school)

When I discussed the use of LCDP in MAM, the majority of teachers I spoke with indicated they thought that there was an underlying motive to this public presentation of data. Sara talked about how using the projector was like making MAM a "show":

Sara – I used to work in P.R [public relations] *before this and when I was getting ready for MAM I just thought 'I'm doing a pitch here'.*

A.C – Like a pitch for new business?

Sara – Yeah, exactly. I hated doing that then, that's one of the reasons I did the PGCE to get away from that. But presenting my moderation results to the rest of the department took me back.

A.C – Is that a bad thing then?

Sara – It's not so much if it's bad, more like what's the point. We're not pitching for new business, and I know education is becoming more market driven, but nonetheless there aren't any clients here. We're all in the same department, and in the same school, so we should be working together. I can't see any point in making us put on a show just because we've got loads of data, and computers and projectors.

(Sara, Science teacher – Interview, KS3 science lab, lunch)

As I discussed in Chapter 3, teachers at Brampton have the opportunity to use the LCDP as much as they wish in their lessons. Each classroom at Brampton has a LCDP and IWB system, so teachers are not alien to using the LCDP in their practice. As Steve commented, he did not feel any pressure in using the LCDP in lessons but did when he used it in MAM:

Steve – I don't understand the point of projecting a presentation about our grades! I can choose when to use the projector in class; my professional opinion is trusted to use it there. But I have to use it for this. I just don't see the point.

(Steve, Science teacher - Field note, KS4 staff room, after school)

The two most prominent concerns Nicola discussed regarding the LCDP in MAM related to imposition, and purpose. She was resentful of the imposition of the use of the LCDP:

Nicola - I use an LCDP all the time in class. I like using it; I'm comfortable and confident using it. But I really resent being told I have to use it to present my MAM scores. Add being told we have to use the LCDP, to the data being stored as ROF, and it says a lot about where the school is going.

(Nicola – Field note, KS3 classroom, lunch)

For Nicola, the use of the LCDP was a symbol for a supposed more corporate culture at the school:

> *Nicola - Just presenting something on a whiteboard doesn't make it better. It's like using PowerPoint, that doesn't make a presentation better. It's what you have to say rather than how you present it that's important.*
>
> *A.C - So is the focus on the presentation itself?*
>
> *Nicola – I think so. The whole PowerPoint thing for classes is really prevalent. I have so many ICT materials which I'm being directed to use. I look at them and if they're good, and lots of them are, I use them. But if there're not I don't. I use some judgement. The new teachers have to use them all.*
>
> *A.C – You're saying that there needs to be some sort of autonomy?*
>
> *Nicola – Yes. Just because something is in PowerPoint that doesn't automatically mean that the content is any good - so many times its style over substance.*
>
> (Nicola, Interview, KS3 classroom, lunch)

None of the teachers I spoke to could suggest what using the LCDP in MAM achieved. Nicola claimed that using the LCDP for multimedia in a lesson made sense, as did using it so that everyone in the class no matter where they sat could see the presentation on the board. But as she pointed out, MAM data was not multimedia, and teachers had no difficulty seeing the information as they could sit where they wished in the room as illustrated in the following observation:

> *The process of projecting the MAM data from the LCDP resulted in breaks in the flow of the meeting. Each teacher had to in turn connect their TPC to the Dsub connector. This resulted in the teacher being asked to log-in to e-portal again. Once the teacher had completed their presentation the same process was repeated for the next teacher. I timed how long the connection, and disconnection, process took and it was about 90 seconds for each teacher. There were 10 teachers in this particular meeting meaning that 15 minutes of the entire meeting was spent, connecting, and disconnecting TPCs to the LCDP.*
>
> (Technology faculty MAM – Observation, KS3 Technology classroom, after school)

For Robert, presenting data via the LCDP appeared to have no purpose other than to position the teacher into an environment of making a 'formal' presentation:

> *Robert - Using the projector formalises the whole thing. Instead of us all sitting down and talking with each other, we have to do this corporate*

presentation. We have to do a business pitch like in the bloody Apprentice. I keep expecting Alan Sugar to appear and say 'You're fired'!

(Robert, Science teacher, Field note, KS3 classroom, break)

Robert's comments resonated with Foucault's suggestion linking technology with mediating a 'homogenous' (1991, p. 202) power effect, which supports a climate of self-regulation. Nicola suggested that that there was no need for such regulation in the first place, particularly regulation which again drew into question issues of trust:

Nicola - I mark the kids work, I really believe in the importance of respecting the work kids have done by giving some meaningful feedback about it. I don't have to be told, controlled, instructed or whatever to do it. The whole process of 'presenting' to the department is so contrived and false.

A.C But to be fair to SLT we both know that not everyone does what they should do. SLT are just trying to get consistency.

Nicola – Yes, but it's just like with the kids – you don't keep the whole class behind because of one kid's behaviour. Those teachers that don't mark work need to be identified and supported. That doesn't mean that most of us who do should be 'tarred with the same brush'.

(Nicola – Interview, KS4 classroom, before school)

The LCDP and ROF in MAM reflect 'controlled de-control' (DuGay, 1996, p. 61) - Nicola claimed that rather than MAM empowering her as a professional, MAM constrained and controlled her practice. Nicola's position was that the greater the illusion of technological de-control, the greater the reality of technologically mediated control. Nicola was not alone in this point – for example, Sandy also experienced technology as both controlling, and reflecting evolving models of constraint impinging on both students and teachers (Goodson, *et al*., 2002, p. 148):

Sandy – I'm being given less and less opportunity for using my own understanding and experience to help the kids. The technology has just taken over.

A.C – How?

Sandy - Well, the Year 7 and 8 Science curriculum is all based on these interactive presentations. All the materials, experiments, everything is based around these scenarios. So, there's this whole scenario about an Accident and Emergency department in a hospital. All the learning is centered on the students becoming characters in this role play. When I first heard of it I thought it was great. But when I used it all the slides are 'Read Only', they can't be changed and they have to be shown in a prescribed order.

A.C You can't change anything?

Sandy – No the entire lesson, and scheme of work, is set in stone. So what seemed to be like a scheme which had less control, you know in terms of a 'traditional' learning model of text books and experiments, is actually the most controlling scheme I've ever worked with.

(Sandy, Science teacher – Interview, KS3 classroom, lunch)

Nicola claimed that the underpinning motive of MAM, was that the onus was on the teacher to get students passed by 'hook or by crook'. This was accentuated by the public presentation of grades in MAM. Like Nicola, Malcolm, made reference to this presentation of MAM data (and the use of the TPC, LCDP and ROF) undermining the legitimacy of MAM data.

Malcolm – Displaying data has this weird effect. It's like I can say any old rubbish, but if it's presented on PowerPoint with lots of animation, using technology gives some sort of authority to it. We're under pressure to be successful, and the more technical things like moderation become the more the pressure is increased. I think that using the technology in such a public way leads to teachers thinking only about grades. It's like learning is not in the picture, what's important are the scores which will be moderated.

(Malcolm – Field note, Staff base, lunchtime)

For Malcolm, MAM positioned the teacher as entirely responsible for the grades of their students no matter what the contextual circumstances might be. As Nicola indicated:

Nicola - I'm directly accountable for the kids' success. What about the chaotic lives some of these kids lead, there's no accounting for this.

(Nicola – Field note, KS4 classroom, before school)

The accountability of teachers was through what Trish called the MAM 'audit', and which was a central part of her unhappiness with MAM. Her position was that MAM was not only an explicit audit of students' grades it implicitly contrasted the effectiveness of teachers:

Trish – We're becoming part of this audit culture that's going on in the NHS [National Health Service] *and the Police and all the other public services. All that happens is that the more stuff we get audited on the more we just think about the audit. It's like teaching to the test except worse.*

(Trish, English teacher – Field note, KS3 classroom, lunch)

As Nicola suggested, the technology mediating MAM was in tension with her implicit personally held rules regarding trust of teachers:

Nicola - Friends of mine ask me all the time how I do the job; you know handling knife wheeling drug-crazed hoodies. I tell them that most of the time my stress has nothing to do with the kids. My stress comes from what teaching has become. How we turn kids from human beings to part of a

spreadsheet, and how the spreadsheet not only defines the kid, but also the success of my relationship with them.

(Nicola – Field note, KS4 staff base, lunch)

Nicola's position was not being trusted to complete marking and to moderate students work, was a slight on her professional identity. This slight was compounded by the use of ROF and the LCDP.

MAM analysis: stage 1

The overriding concepts that emerged from Nicola's MAM data set were linked to how technology mediated trust, and her professional identity. My analysis suggested that there was an implicit sub-text related to storing MAM data as ROF, which represented a reorientation of the relationship between Nicola and some of her colleagues. For example, the concepts of control and surveillance indicated that MAM was as much a system based on observing Nicola's performance, and controlling what she did, as moderating students' coursework marks.

Emerging from the concepts of control and surveillance was that Nicola felt MAM excluded her from the moderation process, which she positioned as a group activity based on trust and a consensus of opinion. Nicola could not reconcile the competition element of MAM, with the consensus and community which she felt underpinned the previous moderation process. Consequently, Nicola felt excluded by MAM, a feeling compounded by the apparent distrust of her when a system was configured to store data as ROF. This exclusion led not only toward her resentment of MAM, but also her sense of loss with regard to the moderation system MAM replaced. The use of ROF and the imposition of a presentation element to MAM, brought into tension MAM and the expectations Nicola had of what the moderation process should be.

The concepts relating to Nicola's use of the LCDP in MAM were less apparent than those linking to ROF but nonetheless significant. The presentation of data using the LCDP was not a stressful or challenging task for Nicola as she used the LCDP frequently in lessons. However, it was the *imposition* of using the LCDP in MAM meetings which was a cause of tension. For Nicola, the use of the LCDP reflected an imposed collegiality, where in a drive for consistency and standardisation she experienced an erosion of her professional self-identity. As indicated in Figure 4.1 and Table 4.1, grouping these emergent concepts together revealed a category that

I called 'technology and trust'. Nicola indicated that having an approach to moderation which was underpinned by consistency was desirable and important. However, the MAM technologies of ROF and LCDP were complicit in what she perceived as a climate of surveillance and control which revealed a lack of trust in her.

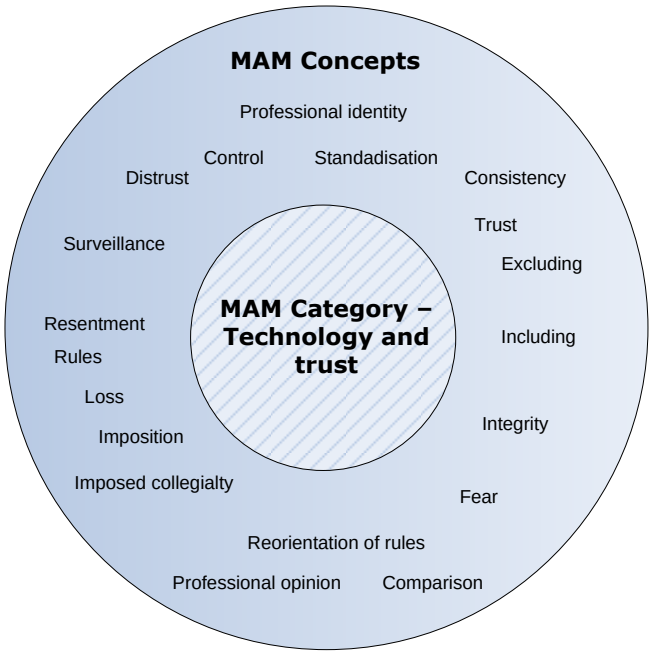

Figure 4.1 Micro-level analysis of MAM data.

The imposition of the technology which mediated MAM appeared to be central to the lack of trust which Nicola discussed. MAM was not the only system in the school stipulating the use of ROF for data storage. For example, the final examination entry spread sheets were ROF. However, the imposition of ROF on Nicola (particularly with regard to moderation which previously was built on a respect and trust of teachers' opinions) was central in the tension between the MAM system and the degree to which Nicola considered herself trusted - there was a conflict between the use of ROF and the LCDP in the MAM, and Nicola's professional identity.

As can be seen in Table 4.1, there were resonances between Nicola's claims and those of other informants at the school. Marilyn, Gail, Grant, Mike and Khuram all discussed how MAM appeared to reflect a lack of trust in them. MAM was positioned as mediating a trustworthy reflection of the school, pupils and teachers. As such, MAM mediated a redefinition of the

process of moderation to become outcome driven in terms of efficiency and productivity and where trust became located within 'hard' data. Marilyn particularly identified an environment where technology was almost synonymous with surveillance, and where she felt that technology mediated her being 'checked up on'. William and Shelia made similar comments; particularly with respect to how surveillance mediated by technology reinforced power relationships (see also my observation of Terri, and Sandy's views on technology and control).

MAM Category	**Technology and Trust**
Concepts	**Analysis**
Trust	MAM positioned as a trustworthy reflection of the school, pupils and teachers. As such, MAM redefines the process of moderation to become outcome driven in terms of efficiency and productivity, rather than a consensus of opinion. Trust becomes located within 'hard' data.
Professional identity	MAM redefines professional identity from one of part of a community of teachers to individuals as competitors. Technology central in mediating the data driven, and performance centred, model of moderation.
Standardisation	Standardisation in product – MAM not concerned with trust of teachers but in fitting the product within standardised metrics. Technology key in defining these metrics – through DDLs for example.
Consistency	MAM identifies standards - technology mediates consistency in those standards. The onus is removed from trusting teachers and put on trusting technology and data.
Integrity	The data-driven need to evidence performance impacts on teachers' integrity through removal of trust. They are in a position where fabrication is part of the culture of the school, and education, which results in tensions between teachers' sense in which they are trusted and the demands of the MAM process.
Rules	MAM technology redefines the informal rules of the moderation process, which reflects a trust in teachers, to a formal and standardised set of rules and procedures.
Opinion	Opinion is reduced through MAM being focussed on data; as such teachers' opinions become less trusted.
Imposition	MAM part of an increasing culture of technological imposition – trust is diminished through deskilling.
Surveillance	Redefining moderation in terms of performance and efficiency of teachers renders the activity, and the tools that mediate it, as part of a surveillance culture – teachers are not trusted without constant observation of their practice.

Table 4.1 Macro-level analysis of MAM data

These teachers' comments resonated with Sammy and Steve who discussed how technology appeared to mediate reorientations of their identities as teachers. Sammy was particularly concerned with how technology mediated changes in the professional relationships between her and her colleagues. In Sammy's view, MAM redefined her professional identity from one of part of a community of teachers to that of an individual and competitor. Technology was

central in mediating the data driven, and performance centred, model of moderation. Emerging from the reorientation of these identities was how technology mediated conditions of standardisation and consistency. MAM did not mediate trust of teachers but was a system which mediated the fitting of moderation within standardised metrics.

These conditions appeared to raise questions regarding the legitimacy of the data which mediated the supposed consistency of moderation (as discussed by Malcolm); and how technology mediated the formalisation of teachers' activities (see Robert's comments). For Robert, consistency, whilst appearing to be achieved by the technologies mediating MAM, was no more than a fabricated presentation of consistency. Indeed, rather than the technologies mediating MAM leading to consistency in moderation, Steve saw how they were being used as 'pointless'. Trish took Steve's further; in her view technology had become a tool mediating audit of her abilities as a teacher, rather than of the performance of the pupils in her classes. This is an important distinction – Trish's view was that technology had mediated a re-orientation of the object of moderation from a collegiate process, to one where teachers were positioned as competitors.

Like Trish, Helen identified how the data-heavy focus of MAM raised fundamental questions of integrity. Helen's view was that if teachers were to become competitors, and that technology mediated data was the indicator of levels of success, then this raised concerns as to the integrity of that data. The prominence of data, and technological mediation, in MAM could be seen in my observations of different MAMs. There appeared to be shift as reflected in my observations of the Science faculty moderation prior to MAM, and the Technology faculty post MAM – the fun and light hearted banter had been replaced by a formal atmosphere based around individual teacher's presentation of data. As Emma commented, the prominence of technology in MAM mediated a 'bringing forward' of the prominence of data at the expense of teachers' opinions.

Rashid felt that the implementation of MAM could have been better handled. For Rashid (an SLT member), there was not an ulterior motive behind MAM which focused on assessing teacher performance – although he maintained that how teachers taught impacted on how well

students learnt and performed. For Rashid, MAM was a means of improving the attainment of the students, and the MAM technologies were the tools which would mediate this improvement - Rashid's concern was that how teachers experienced the technology mediating MAM had not seemed to have been considered.

MAM analysis: stage 2

The prominent mediating tools in MAM were the TPC, the Learning Gateway intranet, ROF and LCDP with Nicola Harvey the subject of the activity. The MAM object was to develop a standardised model of coursework moderation, with the eventual outcome of the transformation process leading to consistent moderation across the school and ultimately improved examination results. The rules of the MAM activity stipulated the format and time window for data entry, the protocols for amending data entries, the storage of MAM data as ROF, and the public presentation of data via the LCDP during MAM. The MAM community included teachers, faculty managers, SLT and the NS team (whose role it was to manage the technical side of ROF data and LCDP maintenance). The division of labour was between teachers, faculty leaders, SLT and NS staff. MAM increased both the demand for data in the school, as well as the importance of such data. Consequently, ROF (which the NS team insisted was necessary to ensure the integrity of data entered onto the school's databases) had the effect of medaiting not just the process of moderation, but what moderation came to represent. Nicola found it impossible to attain the MAM object of a standardised moderation process. Whilst the MAM activity rules might have appeared to support such standardisation, the tensions resulting from what Nicola saw as the imposition of tools such as ROF and the LCDP, led to a fractured and ultimately non-representative activity. Moreover, the introduction of an element of 'public presentation' in MAM via the LCDP resulted in Nicola experiencing forced competition between her and her colleagues. This competition culture undermined the 'in-it-together' community spirit – what I discussed as 'communitas' (Woods, 1995, p. 93) in Chapter 2 - Nicola claimed was present in moderation prior to the introduction of new tools and rules to the activity. Consequently, despite the MAM community sharing the same object, the tool and rules which mediated the activity appeared to make it impossible for all members of the MAM community to attain the object. The tools used to mediate MAM re-orientated the

activity from inclusive and supportive to exclusive and undermining and in doing so damaged the system's community.

MAM also enlarged Nicola's workload. The community involved in moderation previous to MAM was predominately faculty members, after the introduction of MAM this community grew to include the NS team and SLT. Although the MAM divisions of labour increased with the extension of the MAM community, the requirements on individual teachers also increased. With the introduction of MAM, moderation meetings (requiring the presence of entire faculties) increased from 2-3 a year on average to 20-30. This 10% increase in time required for MAM was not offset by a reduction in other duties. Rather than producing BTEC data five times a year for end of term reports and parents' evenings this increased to 25-30 times a year. Again no extra time was provided.

ROF data in MAM reconfigured the activity so as to delineate between teachers and managers and mediated an emerging 'us and them' culture. The clear division between those who could edit MAM data and those who could not, effected relationships between teachers and managers. It also led to resentment not only of the moderation process, but also toward the tools which mediated it. CMIS also mediated the 'us and them' division. The increased demands for data security resulted in Nicola being excluded from all but the MAM data entry window – she was able to access data but only as ROF. Imposing systems which rely on 'obliging people to subscribe to commitments they may not have or may feel unable to meet under normal working conditions' (Huberman, 1983, p. 13), leads to defensiveness and vulnerability. Nicola's participation in MAM demanded of her just such a subscription to 'demands' which she did not share - MAM became a system which imposed 'collegiality' on her.

MAM Discussion

The tools which mediated the MAM system, and particularly how CMIS mediated the centralised access to the various databases in the school, positioned technology as prominent in teachers' moderation of students' coursework. The Learning Gateway as the 'portal' for accessing MAM data not only mediated the activity of data entry, but also defined the rules of the MAM system. However, the ROF and LCDP whilst being tools that ostensibly had peripheral

roles in the process of moderation became prominent in the tensions Nicola experienced when participating in the MAM activity. For example, the object of MAM was a standardised and quality controlled moderation of BTEC coursework. However, the tensions resulting from what Nicola considered as the distrust evident in ROF, eroded rather than supported the communities of teachers needed for such successful moderation.

As with tools, the MAM rules regarding the window for MAM data, the storage of this data as ROF, and the LCDP in presenting teachers' data, also mediated tensions and conflicts - particularly the rule stipulating the protocol for the amendment of MAM data. Nicola acknowledged the importance in MAM data remaining uncorrupted or accidentally erased. However, she experienced the highly regulated process of making amendments to MAM data as embarrassing, undermining and disempowering. This was similarly reflected in the 'imposition' of the LCDP to present data. These tensions, allied with the element of competition in the MAM system, influenced the MAM community. Despite the members of the community sharing the object of a successful moderation process, the MAM rules suggested a differentiation between teachers, faulty leaders and SLT. The access to MAM data as either ROF or RAM signified not only a differentiation between levels of access to editing data - Nicola saw this as a differentiation in levels of trust.

The division of labour in MAM was also redefined. Whereas previously moderation had been a group activity with all members of a faculty furnished with a colligate interest in the success of all members of the community, the new model of competition challenged this. With peers positioned as competitor the underpinning object of group success appeared to have changed. Individual teachers were still defined by the success of their faculty as a whole. However, in MAM teachers' personal performance was as visible that of the faculty as a whole. Moreover, teachers experienced a significant increase in the time they were expected to spend on MAM with no decrease in other activities.

As I have indicated on Figure 4.2, I have suggested a contradiction in the MAM activity system between the tools which mediated MAM and the subject. This contradiction manifested in conflicts which ultimately prevented Nicola from attaining her object. Moderation can be seen

as a group process (see for example, Vlachopoulos & Cowan, 2010, p. 216) which is based on a respect for, and trust of, teachers professional opinions. Positioning MAM data as ROF indicated a distrust of Nicola and ultimately the moderation process itself. Moreover, storing MAM data as ROF appeared to bring into question Nicola's motives for accessing the MAM data.

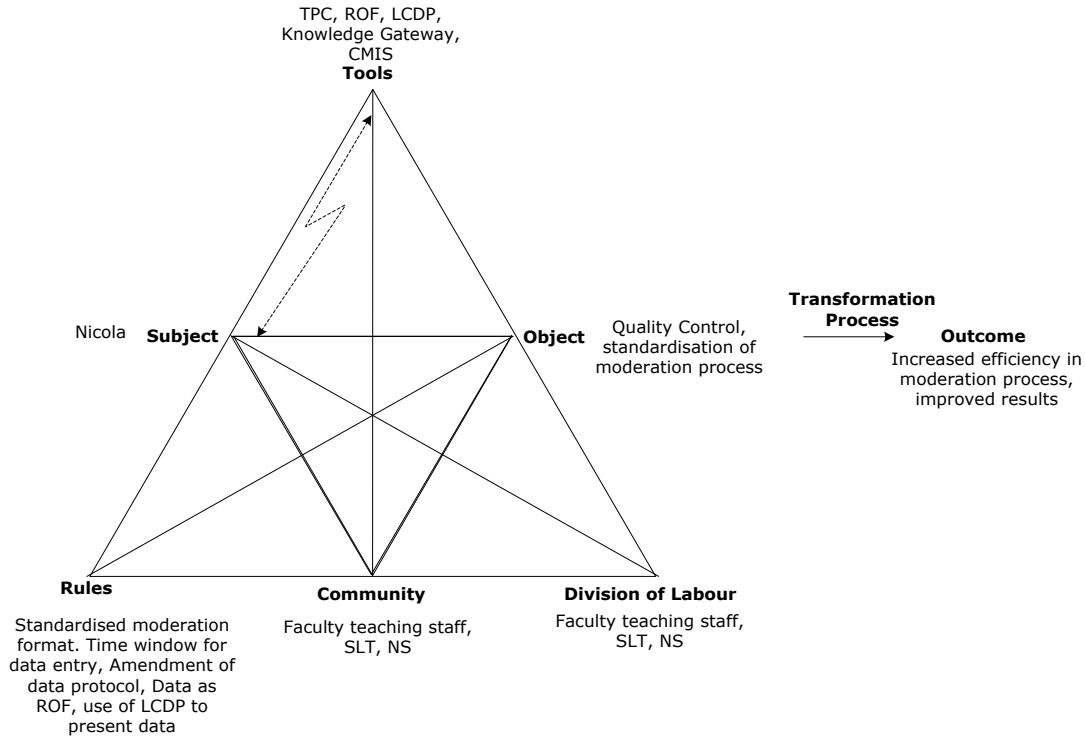

Figure 4.2 MAM activity system

Locking MAM data from editing (other than by those with authorisation) raised the question as to why there was a need for such an application. Of course the MAM data could be accidentally altered, erased or corrupted and thus ROF storage would prevent this eventuality. However, the positioning of the ROF as an intrinsic part of the MAM system suggested that either such corruption was frequently reoccurring, or that teachers were deliberately accessing MAM data to make amendments. There appeared an underlying tension between the subject of the MAM activity system and ROF which destabilised the 'assessment community' (Orr, 2007, p. 654) necessary for meaningful moderation.

My findings supported the identification of the contradiction in MAM which manifested in conflicts between Nicola, the MAM activity, the immediate community of her peers, and the school's management. By identifying the contradiction in MAM, I was able to demonstrate how

technological developments brought new pressures to Nicola's work that could not be resolved. Nicola was responsible for meeting the moderation expectations of the school. The requirements of MAM led to Nicola, NS team members and SLT working extra hours to meet these requirements. The conditions of the MAM contradiction, particularly the tensions relating to the redefinition of the moderation process and the resulting redefinition of the object of moderation, became an obstacle to object attainment which Nicola could not overcome.

My positioning of the contradiction between tools and subject reflects the tensions in the MAM system. Nicola supported moderation - however, MAM and the tools mediating it resulted in conflicts between subject and tools. For Orr (2007, p. 654), moderation is based on a 'consensus of opinion'. However, in MAM each teacher was positioned as an individual whose decisions were presented to his or her peers for scrutiny. The comparison of class with class, and teacher with teacher, and the presentation of this data in the MAM forum through the LCDP appeared to be contradictory. The use of ROF and LCDP in MAM led to a situation where instead of technology mediating Nicola in attaining her object they instead prevented her from doing so.

4.2 Real-time reporting

Real Time Reporting (RTR) was first implemented at Brampton in the 2006-2007 academic year. The following statement was made by Rashid, the member of SLT responsible for RTR and appeared in a BECTA document regarding 'next generation learning':

> *Real-time reporting is enabling parents to construct meaningful dialogue around their child's learning and progress at school. Access to the system is secure and parents can gain access by subscribing via the website. Up-to-the-minute information about attendance, behavior and attainment means that parents can now get an ongoing record of progress rather than just the usual snapshot in the form of monthly reports.*
>
> (Rashid, SLT – Field note, Brampton High web site)

RTR was an intranet and Internet system which parents could opt to subscribe to with two different layers of functionality. First, parents could use the RTR portal to access data for their child relating to attendance, behavior and performance. This data was available through a log-in and password enabled Internet application. Parents could log-in to the school's web site, and access the RTR application on the intranet Learning Gateway – see Image 4.6

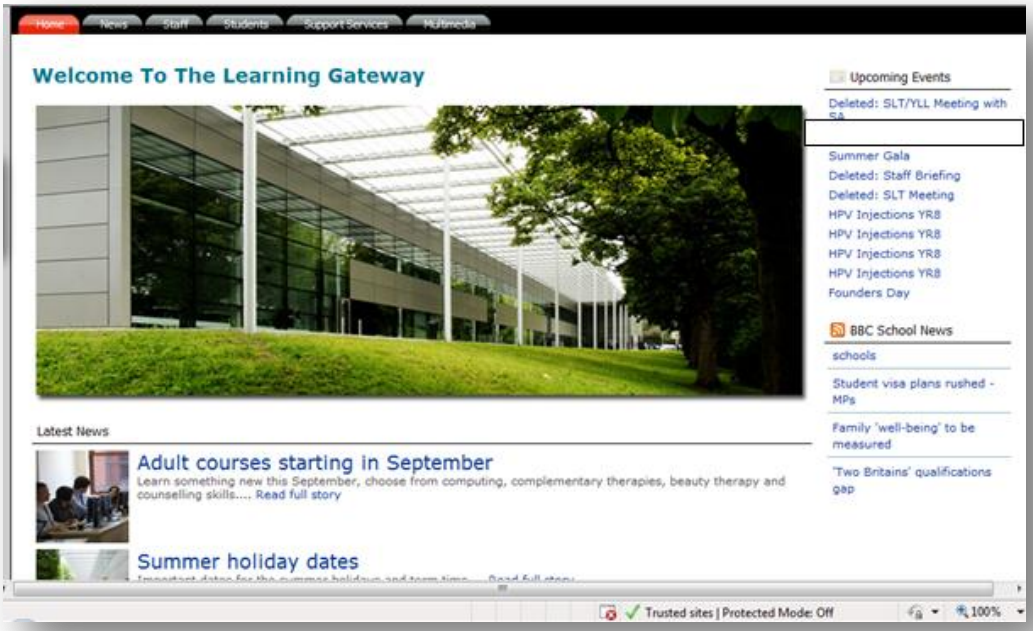

Image 4.6 Learning Gateway

This data was displayed as tables of figures, histograms and scatter graphs relating to students' test results, module scores, behavior 'events', and attendance data (an event is a Learning Gateway application where positive and negative comments are logged by teachers regarding a student's behavior – see Images 4.7 And 4.8).

Image 4.7 e-portal student data

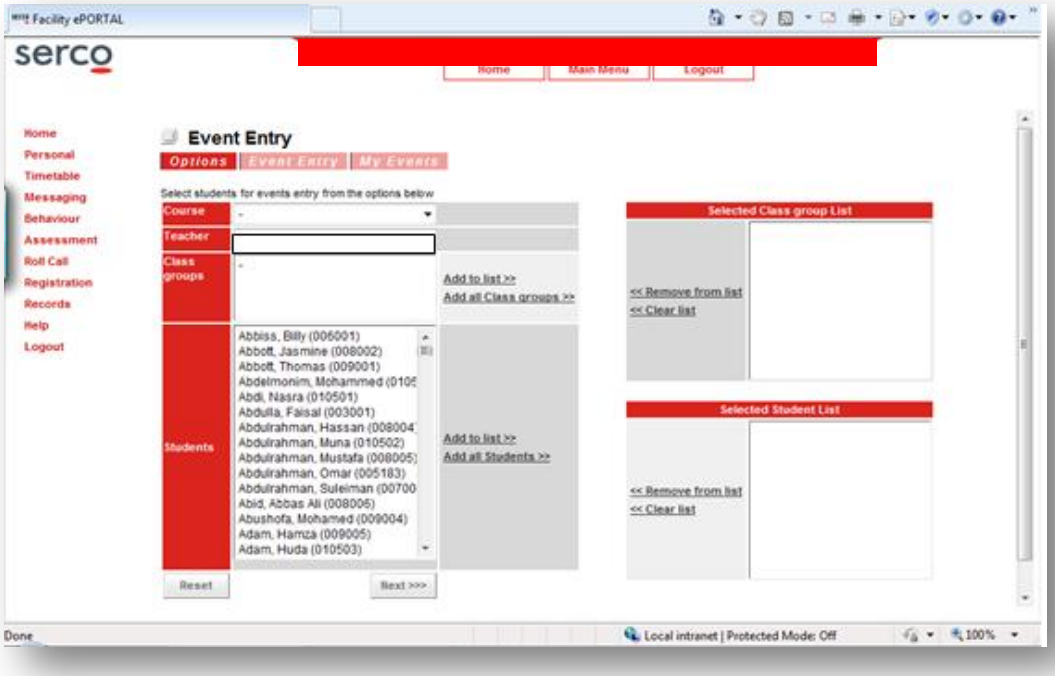

Image 4.8 e-portal event entry screen

Underpinning RTR was that as soon as data was entered onto the school's intranet system it became 'live' and accessible by parents:

> *I saw Nicola taking the register on her TPC for period 1 with her Year 9 class. She opened the learning gateway, and clicked on the Staff tab which took her to the e-portal entry screen. She then clicked on the registration tab which displayed the data entry portal for class she was taking. From this screen she was able to access information for the class and individual students. Nicola used her TPC pen to click the registration code form a Drop Down List (DDL) which matched the students attendance at that time. On this occasion the whole process took no more than 90 seconds. From the point that data was entered onto e-portal it became 'live' for access by staff and parents – the result was that all parties that had access privileges knew who was in Nicola's class less than two minutes after she had taken the register.*
>
> (Nicola – Observation, KS4 classroom, morning)

The second function was the use of 'texting' to contact parents. As well as giving parents the opportunity to access information relating to students via the Internet, RTR also presented the opportunity for parents to be contacted using different communications media such as Social Networking Sites (SNS). Although parents were given the options of being contacted by Facebook and Twitter, texting was the most popular technology identified as an additional communication tool complimenting more traditional tools such as letter, telephone or email.

RTR in mediating parents' access to information was portrayed by the school's management as particularly innovative, as this was possibly the first occasion in the UK where a school gave parents access to real-time data regarding their children. Rashid was particularly involved in the introduction of the system:

> *With the link up we have with SERCO and the whole CMIS system we've really been able to take data to whole new level. Having an integrated system where all the data we enter is accessible to the people who need it is something that's not really been done before. The technology we've got here is the next generation, the future of school information.*
>
> (Rashid, SLT – Interview, SLT office, before school)

Additionally, RTR was referred to by BECTA as an exemplar of:

> …practice strengthening the role of technology in improving interactions between providers (for example school and teachers) and children, young people and parents. (BECTA, 2009, no page)

The technological investment in RTR required the installation of a new dedicated server and CMIS network, so that the different applications were compatible. This was in conjunction with the administrative requirements, where a team of support staff was given the task of instigating the RTR system. As RTR data was confidential security was an important concern, parents had to be able to access their own child's data but not any other data. RTR also had a security system to prevent potential hacking, with RTR stored data as ROF to prevent unauthorised amendments:

> *Keisha - RTR has raised some real challenges. Although the system's configured to be able to do everything we want it to, getting it to do it all the time is a different thing.*
>
> *A.C – What sort of challenges?*
>
> *Keisha – Well access mostly. Getting the data live is the easy part. It's configuring the system so that all the different levels of access are right. Obviously we can't have parents accessing other kids' stuff. We can't have people hacking through the portal.*
>
> *A.C – So it's primarily security?*
>
> *Keisha – To an extent. There's also the stuff to do with the data itself but that's another story.*
>
> *A.C – What do you mean?*

> *Keisha – It's my job to get the system to handle the data – but it's the teachers' job to handle all the stuff that comes out of extending the access to all that data. The more people that can access data, the more questions there are. You can't just give people data and not have the systems which support them in answering any questions the data raises.*
>
> (Keisha, Networks Services Manager – Interview, NS office, after school)

There were two prominent types of technology mediating RTR - the school's Intranet Portal (IP) and Short Message Service (SMS) texting. An IP acts a gateway or 'portal' to an Internet website through a webpage. The IP used at Brampton was called the Learning Gateway which aimed to provide a simple and quick means of accessing different pieces of information within the complex Internet structure of such a large school. The Learning Gateway clearly labeled the website using 'tabs' which indicated where the user should navigate to so as to access specific information.

The Learning Gateway raised security concerns due to the website being accessible on the Internet - if an authorised user breached the Learning Gateway security 'firewalls' then all of the school's sensitive information relating to child protection, SEN statements and students on the At Risk Register would be compromised. Consequently, two security devices protected the Learning Gateway. First, some of the Learning Gateway tabs were only accessible through a user name and password log-in as in Figure 4.9 – these were 'password protected access' tabs (some tabs were not password protected access which were 'open access' tabs). Second, the data stored on the password protected tabs was 'encrypted' to prevent a hacker from being able to access the data in immediately useable form. The Learning Gateway had six tabs which could be accessed by the user and which related to different areas of the portal. The 'home page' tab, as shown in Image 4.6, was open access, and had a collage of images representing the school, and a number of scrolling messages relaying up-to-minute information regarding examination results, events and sports results. The home page was where the remaining five tabs could be accessed.

Image 4.9 e-portal log-in

The first of these tabs was the open access 'news tab' which gave information regarding competition winners, a news archive, and links to teachers' 'Tweets' on the school's Twitter SNS page. The 'staff tab' was password protected and was the means staff had of accessing the different parts of the school's intranet system. When a teacher logged onto the staff tab they could access data relating to each individual faculty in the school. This included schemes of work, lesson plans, faculty plans, policies and resources. Teachers could also access staff briefings, email, policy documents, attendance data, the Media Resources Centre (MRC), and contact the NS helpdesk for reporting damaged or malfunctioning equipment. The staff tab also gave teachers access to the e-portal attendance system.

The 'student tab' was password protected and allowed students to access learning material relevant to each faculty. For example, the English faculty section on the student tab gave specific information regarding tasks relevant to different Key Stages, the aims and objectives for each unit of work, and signposted links to PowerPoint presentations. The 'support services' tab was open access to the supplementary services which supported the school. For example, external organisations could book the use of the school's facilities such as classrooms, the conference halls and sports fields via this tab. Although accessed via the support services tab, the parents' tab was password protected and was where parents could access the RTR information regarding their child. This tab also held information regarding calendar events,

examination requirements and a parents' forum for blogging. The final tab, labeled multimedia, was where video images, sound files and press release regarding the school could be open accessed.

The second technology group mediating RTR included communication tools such as SMS. SMS is the 'text' communications service component of a mobile phone, web tool or mobile communication system. SMS mediates the exchange of short text messages between fixed-line or mobile phone devices through the Global System for Mobile Communications (GSM) standard for mobile telephony systems. Initially, SMS was seen as a means of utilising unused parts of the GSM system for relatively low cost. Consequently, due to SMS being an 'add on' to the GSM system, and to prevent SMS from impinging on telephone traffic, the message size was limited to 140 bytes or 160 characters in length.

Offering RTR text messaging required Brampton to redefine a number of rules, communities and divisions of labour, a new server to be installed, and a support manager employed. The process of implementing RTR began with the RTR support manager contacting parents asking if they would like to join the RTR database and receive text messages from the school. Those parents who replied (the RTR support manager gave me an estimate of 175 RTR text contact details for the 2008-2009 academic year) were asked to provide a contact number to which texts could be sent in particular circumstances. Parents were able to stipulate what information they received via text for example relating to attendance, punctuality, test results and behavior. As members of staff entered data onto appropriate database via the Learning Gateway, this data was 'tagged' by CMIS in relation to parents who stipulated receiving text alerts. The RTR server emailed a report to the support manager when data was updated. The support manager then accessed a statement bank which contained pro-forma messages which corresponded to the information being sent. The appropriate information was entered into the message bank statement which was sent as a text to the parent.

RTR was originally envisioned as using statement banks which automatically entered the data from the Learning Gateway via CMIS. Unfortunately, the expected link between the Learning Gateway and the SMS system was never successfully implemented. Consequently, instead of

the automated system, RTR became reliant on the support manager for ensuring the correct data was entered into the correct text pro-forma and texted to the correct recipient. The RTR system also had to be protected due to the weak encryption of messages between the sending device and the receiving station. The school's SLT were particularly concerned with the possibility of 'spoofing' (spoofing is when text messages appearing to be sent from one user is actually being sent from another device posing as the original sender) where the school could be 'impersonated' by another user and which had consequences for the legitimacy of RTR text messages:

> *Rashid – Spoofing could be a problem with this. We've already had some issues with people outside the school trying to hack in.*
>
> *A.C – Do you know how?*
>
> *Rashid – Well, the most obvious way is members of staff not hiding their log-in when they're accessing e-portal during a lesson. A clever kid could look at the teacher as they are logging-in and get their password. Then it's easy. I'm not sure, but I think some kids have used their phones to film teachers logging-in and then having a go at seeing what the log-in was from the recording.*
>
> *A.C - So how do you address it?*
>
> *Rashid – Each parent is given a code, so when they reply to the text they have to include the code in the message so we know it's them. As for the log-in theft, well that's a case of being more aware what's happening in the classroom.*
>
> (Rashid, SLT – Interview, SLT office, break time)

In operation, the RTR system was 'invisible' to teachers as it was only accessible via the log-in and password system used by parents. Consequently, I had to interview a member of the NS team, Ray, to understand how RTR worked:

> *Ray – RTR is really an integrated data systems management setup. SERCO do stuff for so many different companies and organisations. They really know what they're doing. We don't really need to do much as far as the SERCO and CMIS bit goes. Our problem is ensuring the intranet is robust because if the intranet drops off then all the data entry stops. Teachers can't access e-portal, registers aren't taken and RTR doesn't have any data.*
>
> (Ray, NS, Field note, NS office, break time)

For example, there was no drop-down message indicting that the RTR system was being accessed by parents, nor did teachers know which parents had signed up to the RTR service. I interviewed both Nicola and David about their experiences of RTR and triangulated this data

with observations and informal discussions with a number of other teachers. The data generated from these interviews and observations related to information in RTR, and the technological meditation of communication between the school and parents.

There were two broad areas which emerged from the RTR data. First, the legitimacy of the data communicated to parents, and second, the appropriateness of using text for contacting parents. Nicola suggested that there were benefits from mediating parents' access to information about attendance, behavior and attainment via the Internet. She also embraced the idea that information should be shared, and certainly that the school should involve parents as much as possible about their children's' education.

> *Nicola – What Rashid* [the member of SLT responsible for RTR] *said about RTR really made sense to me. I've been going on for ages about how it's vital we get more of the parents 'on-board' with what we're doing.*
>
> *A.C – So giving them access to as much data as possible is a good thing?*
>
> *Nicola – Well we've got to be careful. I don't mean that the parents don't understand the data, although lots of teachers don't, it's that just numbers isn't going to help. We've got to be sure that the stories are told as well.*
>
> *A.C – So your concern is that it's going to be about academic performance?*
>
> *Nicola – Yes, but if that's what the parents want, test scores and grades and things, then they should have it. But the kids are part of this as well. If a bright kid starts doing badly in my experience there is usually something going on. It might be at school, but it might be at home. Just sending out numbers is going to counter-productive if that's all we do. There's got to be some follow up.*
>
> (Nicola, Interview, KS4 classroom, break time)

However, she also positioned RTR in terms of disempowerment:

> *Nicola - RTR is supposed to be about empowerment, engagement, flexibility and choice. I don't think that's the case though.*
>
> *A.C – why?*
>
> *Nicola – Well I've got real worries about the data that's being used.*
>
> *A.C - What do you mean?*
>
> *Nicola – There's two things. I'm worried that there are too many mistakes being made by teachers when they enter the data. The pressure to enter data is increasing so much that it seems like we spend all our time on it. But if I'm taking a challenging class, and I have to concentrate on entering data from a test there and then, that has an impact on how much attention I can give to the class.*

A.C – So you do it later?

Nicola – Sometimes. But then that becomes another job to do. I resent the amount of time that I have to spend on data entry and analysis. When do I have time to do all the other things?

A.C – You said two things…

Nicola – Oh yeah. The other thing is what does this data represent? It's like the more data we need to produce, in this case for parents, the more the focus is on the data rather than the learning. I'm not sure what all this testing is for - is it to help the kids or is it about making the school look good?

(Nicola – Interview, KS4 classroom, break time)

Like Nicola, Craig suggested there was a link between the learning gateway and RTR protocols preventing unauthorised or accidental access to data, and teachers feeling disempowered by the system - Craig talked about the e-portal removing teachers' ownership of the attendance and punctuality data and increasing the demands on their time in answering parent' questions.

Craig – If the system is completely live, then that means that as soon as I take a register that information is available. So what if I'm phoned up by a parent about why their kid isn't in. How am I supposed to answer that sort of question when I'm teaching? I don't have a secretary, or a data crunching assistant. I'm teaching my lessons. How am I supposed to be able to answer real-time questions?

(Craig, Humanities teacher – Field note, KS3 classroom, before school)

This was compounded by the anonymity of parents who had subscribed to the system. The lack of ownership appeared to have the effect of setting RTR as a system 'in itself'. Ozzy suggested that e-portal seemed to have taken on a role of not just tool for accessing information, but as the solution to a whole raft of challenges:

Ozzy – RTR has taken on a life of its own. It's like a sentient being. This is just a computer system, it's just a tool, and it can't do anything on its own. It can't talk to parents, reassure them, and tell them that as a school we're able to help their kids. I'm worried that with things like this people start to lose sight of what they should do, that they need to contact a parent because that parent might be worried. We need to increase face-to-face contacts not reduce them.

(Ozzy, SWO – Field note, KS3 classroom, break time)

Like Ozzy, Nicola suggested that for some of her colleagues RTR appeared to have transcended that of a mediating tool - RTR had become a technology outside of the effect of teachers and operated as a self-determining system. Moreover, Nicola suggested that the school's management positioned RTR as itself a change agent:

> *Nicola - The question has to be what's the point of RTR? All RTR actually does is inform, it doesn't help directly. A machine can't directly help. What I mean is that a parent accessing RTR is the start of the dialogue not the end. RTR can't sort out why a kid is always late on a Tuesday morning, although that seems to have become the assumption.*
>
> (Nicola – Field note, KS3 classroom, break time)

Nicola's claims that RTR (and the technology which mediated it) appeared to be ascribed with its own agency resonates with my examination in Chapter 2 of technological determinism (Fleck & Howells, 2001, p. 526) and the transformational agency (Fisher, 2006, p. 301) sometimes ascribed to technology. Nicola was also frustrated that RTR was held up as a paragon of technology at the school – and that the technology mediating RTR was given a high profile by the school's SLT through the local press, and visits by members of the Government:

> *Nicola - The press is in the school so often. We've been on Teachers TV lots of times, and we've had visits from the PM* [the then Prime Minister Tony Blair] *and the Secretary of State* [for education]*. And of course they talk to the kids and have photo opportunities with them, but the focus is always actually on the computers – this application, that piece of software, it's like everyone is saying look at all this, isn't it great.*
>
> (Nicola , Field note, KS3 classroom, lunch)

Sally commented that RTR could do nothing more than give access to information – for her,, RTR seemed to have 'taken over' as the primary way the school communicated data to parents:

> *Sally – The technology is increasing, and we've become more reliant on the technology. That's the way of the world. But what's happening is that there's only the same amount of time in a day. Technology is supposed to increase the amount of time we have for teaching and learning. But all that's happened is that the time freed up computers has been filled by more things to do. That's why we stop doing the old things like face-to-face meetings and instead use technology. I have to do more things now than only 5 years ago. And all these things are technology based.*
>
> (Sally, Mathematics teacher. Field note, KS4 staff room, break time)

Nicola echoed Sally's concerns, and was particularly critical of RTR appearing to be positioned as a tool which would transform attendance and punctuality in the school:

> *Nicola – RTR isn't transforming anything. It's just a tool and can't do anything without people.*
>
> (Nicola – Field note, Field note, KS4 staff room, break time)

Nicola's concerns regarding the transformational qualities of RTR resonated with Fisher's (2006, p. 301) view, that agency is with the 'human agents' who use technology rather than the technology itself. For Nicola, the supposed agency ascribed to RTR resulted in tensions between teachers and their colleagues. Nicola was adamant that RTR had resulted in some teachers not following up their duties regarding students' attendance and punctuality:

> *Nicola - Teachers are just leaving it to the system to sort issues out. All RTR does is give a means of accessing data. It's up to the teacher to make sure something happens if there's a problem.*
>
> *A.C – So does that mean you think teachers are doing less?*
>
> *Nicola – Some are. I work with some teachers who are so stressed and under pressure that they see RTR as something which does a part of their job for them. But that's not the way it should be used at all. When parents get RTR data they need to be engaged with. As a school, and as teachers, we have a responsibility to parents. That's why when we send out reports there's a parents' evening to go with the report. We don't just leave them to get on with it on their own.*
>
> *A.C – RTR does leave them on their own then?*
>
> *Nicola – Unless teachers are able to talk with parents about the data that's available then yes, RTR leaves parents on their own. And teachers need to be aware that they have a responsibility to support parents – not just leave a computer generated message to do their job.*
>
> (Nicola – Interview, KS4 staff room, after school)

Kevin, who was listening to Nicola's comments, supported her position by discussing what he saw was an "over reliance" on RTR which was ultimately damaging to the relationship between the school and parents:

> *Kevin – All the technology we have here doesn't necessarily have the effect that's expected. We want to communicate more with parents, give them access to information, and support them in supporting their kids. But I'm not sure that's what's happening. We seem to be putting in more systems, and use more computers, and it's making everything more complicated. We want our parents to be involved but being involved is about dialogue.*
>
> (Kevin, SWO – Field note, KS4 staff room, after school)

For Nicola, this over reliance was further compounded by two factors, first that not all parents had opted to access RTR, and second that there were concerns regarding the accuracy of data used for RTR. For example, Eve talked about how easy it was to make an inaccurate data entry into the e-portal attendance register (I discuss e-portal in more detail in Chapter 5).

> *A.C – How do you find using the codes?*

Eve – Well it's really hard because we need all these codes. With the way the school works kids are going off all over the place, lots go to off-site educational venues so we have to be able to show that they're not 'bunking' off.

A.C – So why is that hard?

Eve – Because there are so many codes, and the screen is really small so just seeing which code is which takes lots of time. It's really easy to make a mistake as well. When we take the register for period 1 it's in lesson time that puts different demands on you. You have to get the class started, sort out books, worksheets, and also use the computer for tasks and stuff. And then you've got to take the most important register of the day as well.

A.C – So, the complexity of all the codes adds to the difficulty of completing the register?

Eve – Not just the codes, it's the whole way of taking the registers really. I rush it and then I make mistakes.

(Eve, Science teacher – Interview, KS3 Science Lab, non-contact)

Eve's comments were similarly raised by Nicola:

Nicola - It's so easy to put the wrong code into e-portal. There's a list of kids in the class which you have to scroll down as it's not all in view. Then there's about 20 different codes that can be put in. The box is so small you can hardly see them.

(Nicola – Field note, KS3 staff room, before school)

As Nicola continued, the difficulties of data entry were further accentuated by the use of the TPC as the machine for data entry:

Nicola - Because the tablet is small the screen is small as well. So the e-portal stuff which is small on a PC screen is even smaller on the tablet. Using the pen for data entry is really hard as well, especially if you are rushing. The other thing is that you can't project whilst you're using e-portal as the projector doesn't allow you to freeze the image. So you can't project a task from the tablet when you're taking the register, you have to set up something else.

(Nicola – Field note, KS3 staff room, lunch)

Nicola's claims regarding data entry were supported by my own observations. What follows is my Field note of watching a Science teacher, Fran, entering attendance data onto e-portal:

Fran was taking the register for Period 1 with her Year 7 science class. As the class came in she greeted each student at the door and gave them a piece of paper upon which was printed a starter activity. The lesson started at 8.30 and she was at her door meeting students until 8.38. Fran had also written

instructions on the whiteboard for students to follow when they had finished the starter.

Fran had logged onto her TPC and was projecting the lesson aims and objective via the LCDP. When Fran came into the room, of her 22 students, 19 had arrived and were engaged in the starter activity, getting their work folder, reading the aims and objectives, or getting text books. At 8.40 Fran stopped the class and explained the activities for the lesson – the students got themselves into groups of 3 or 4 for the first activity.

At this point a student came in to the class who was 10 minutes late. She apologised to Fran and immediately looked at the instructions and began the task. At 8.48 Fran, removed her TPC from the Dsub connector and began to take the class register by entering the appropriate codes next to the student's names. She later told me that she had to disconnect the TPC from the LCDP because she could not 'freeze' the screen and as such the register, along with student photographs, would be projected to the whole class.

Fran's experience was that this could be disruptive – students would comment on other student's photographs, or on middle names, or on full names. To alleviate this possible tension Fran disconnected the TPC from the LCDP to take the register. Fran did not call names out as she wanted the registration process not to distract students from the learning tasks. Nonetheless, Fran was engaged in taking the register for over a minute. On two occasions she accidentally clicked on the incorrect code and she had to amend this mistake.

Fran had to complete the register in a 20 minute window after which all attendance data would become live on RTR. At 8.51 the last student to arrive for Fran's lesson came in. This student shouted "I'm not late" and was quite distressed. He ignored Fran's attempts to offer the starter sheet and continued to tell Fran that he was not late. Fran told the student that he was late, but that they could discuss the situation after the lesson. The student became even more agitated at this – he shouted "this is fucking shit" and walked out of the room. Fran let the student leave – the rest of the class seemed to ignore the incident and carry on. Although Fran had re-connected her TPC, she then had to disconnect it so she could send an e-mail to the student's SWO informing her of the incident. Fran, had to then enter that the student was 'internally truanting' into e-portal.

At 9.01 Fran received an e-mail from the Student Support Administration team asking why she had entered a registration code after the 20 minute window. Again, Fran had to disconnect the TPC so that she could send a response to this email.

(Fran, Science teacher – Observation, KS3 classroom room, morning)

My observation of Fran, seemed to support Nicola's claim that RTR put unreasonable demands on teachers and the community of teachers of which she was part:

Nicola RTR only works if the data is accurate. The stress that people are under here means that it's impossible to guarantee this.

(Nicola – Field note, KS4 staff room, after school)

For Nicola there appeared to be tension between what RTR promised, what it delivered, and the 'truth'. The word truth appeared frequently in the RTR data – for Sammy, although RTR

might be a live system working in real-time, but that alone did not mean that the data being reported had an increased level of truth:

> *Sammy – Things like RTR just elevate the numbers we produce. They don't tell the truth though. What these tests, and exams, and awards show is how the school has to portray itself to its 'customers'. Exams are important, progress and attainment are important. But they've become the 'be all and end all'. The truth is that lots of the students here won't get 5 A*-C grades. But they will have achieved fantastically well nonetheless. All this data does is sort of fabricating this false picture. We ignore all the really important stuff about emotions and relationships and 'make up' indicators. The computers, and spreadsheets and CMIS are all part of this. The more technology we have the more the 'truth' becomes something that's turned into data, into 'hard' numbers.*
>
> (Sammy, Languages teacher – Field note, KS3 staff room, lunch)

Sammy was concerned that the picture portrayed to parents accessing RTR data was not an accurate one - comments which reflected the 'fabrications' (Ball, 2003, p. 224) I discussed in Chapter 2. Nicola's claim was that the demand RTR had for information was so great that this information became a fabrication and consequently devalued:

> *A.C – You talk about information being devalued.*
>
> *Nicola - RTR is like a 24-hour news channel; it only has a point if there's 24-hour news. There's more and more news available and demanded. RTR only has a point if there's information and it demands more and more information.*
>
> *A.C – So you're saying the more capability for communicating information the more there is a need for information?*
>
> *Nicola – Look, I have a i-phone, I look at it all the time, I use Face Book, I Skype my mates. I'm not a dinosaur. But the 24-hour news culture is coming into schools. Don't get me wrong – parents must be involved in the school, they must. But all the data we generate just requires more technology, and then we generate more information. I just think we're missing the point of a school like this. We need to support the kids in learning about life, about being able to be a citizen, especially considering some of the tough backgrounds some of them come from.*
>
> *A.C Just giving parents access to 'data' isn't enough?*
>
> *Nicola – No, the parents, and the kids, deserve more.*
>
> (Nicola – Interview, KS4 staff room, after school)

Nicola's claims were supported by Adam who suggested that the constant demand for real-time information influenced on the nature of that information. For Adam, despite RTR having the object of empowering and including parents, it had actually disempowered them because of inaccurate information:

Adam – Information is only empowering if it's accurate, if it's meaningful, if it's true. I know that I'm under so much pressure when I take the register during period 1 that I must make mistakes that I don't see. And test results only reflect a moment in time. I want parents to be empowered because there's got to be a partnership between them and us. We've a responsibility to them that the data they access is accurate, but also that it's not the whole story.

(Adam – Technology teacher – Field note, KS3 staff room, after school)

This was a position supported by Nicola's experiences of RTR, which suggested that data was inaccurate and that teachers abdicated responsibility because RTR disempowered them:

Nicola - There are teachers here who I used to really respect but [since RTR] *I've lost respect for them. They shouldn't let a system stop them from doing what's right. I know people are so tired and de-motivated, but you've got to make a stand for what's right. It's as if these systems have taken over from the things teachers used to do.*

A.C – So people rely on the system?

Nicola – It looks like some do. When you put a new piece of technology into somewhere it's not like everything just stays as it as – everything changes in some way. It has happened with RTR; instead of it just being a tool it's become something in itself. I mean, it's become like this mantra that people keep saying, "RTR will sort it", "the parents can use RTR", and that's just abdicating responsibility.

(Nicola – Interview, KS4 staff room, before school)

Nicola also talked about RTR mediating the professional relationships between colleagues:

Nicola - There's been tension between teachers because of RTR. Arguments because teachers have been contacted by a parent about something on RTR, and then the teacher finds the data isn't right.

(Nicola – Field note, KS3 staff room, after school))

Nicola's comments reflect 'common destiny' (Woods, 1995, p. 93) and the meditational effect of technology on this destiny. Positive experiences of community are located in the constructive action (Jeffery & Woods, 1998, p. 146) of those who form the community. Nicola's data was located in the apparently paradoxical effect of the RTR on issues of camaraderie and common purpose. Nicola's issue with RTR was its effect on teaches' common destiny, what she called the 'in it together' spirit:

Nicola - Teachers have sort of given up with some things they used to talk to parents about. It's [RTR] *had the effect of actually reducing how much teachers communicate with parents.*

A.C- Is that your opinion, I mean do you have evidence?

Nicola – Well only anecdotal, but there's a story emerging. I speak to lots of support staff, and particularly the SWOs, and they've noticed it. Since RTR the SWOs I work with are saying that contact with parents by staff regarding pastoral stuff has dropped off – and that even academic contact has reduced. The SWOs are having to field more calls from parents and are having less support from teachers. Of course that could be because of lots of different reasons. But it has coincided with both RTR and SAA which are heavily technology based.

(Nicola – Interview, KS3 staff room, lunch)

Nicola's claims were supported by my own observations. For example, I witnessed an argument between two teachers, where one teacher was accusing the other of not contacting a parent about a test result:

Shelia – I've had Steph's mum on the phone about the test score she got from you.

Mary – Ok, what happened?

Shelia – Well first off she couldn't contact you. Reception phoned the staff room and you weren't there and I emailed you three times.

Mary – I travelled at break, and at lunch,… I was having a break. As soon as I was able I checked my emails and then I contacted you.

Shelia – Ok, so what happened with the test score? I wasn't able to answer any of Steph's mum's questions.

Mary – Steph had a netball match, so she only did half the test. When I went to enter the score on the data base I couldn't put anything in. Well I could've put 0 which I suppose I should've. But I put the score Steph got which still wasn't bad even though she had to go halfway through.

Shelia – Ok I see. Well I think you should've put 0, at least then it would've flagged up that something was unusual.

Mary – But she didn't get 0, she still got 52% on the test even though she only did just over half of it.

Shelia – Yes, but FFT says that she should be averaging 70-80% and that's why the parent was concerned.

Mary – I agree with you, but the system just didn't let me enter the correct data.

(Shelia YLL, Mary Physical Education teacher – Field note, KS3 staff room, after school)

From the above conversation it transpired that the child's parent had accessed attainment data on RTR which indicated that their daughter had achieved an unusually low test score. The parent had not been able to contact Mary, the class teacher, about the result and was instead transferred to Shelia who was the student's YLL. Sheila was not able to answer the parent's

questions. What transpired through the argument was that the student had played in a netball match and had left school early and therefore she only completed half the test. Mary entered this on her class register, but RTR only gave access to entering the test score - the restrictions of the RTR database mediated the information accessible to the parent. Shelia was not able to answer the parent's questions and felt undermined by her lack of information. Mary felt that she had followed the correct procedure which unfortunately resulted in a parent being given access to misleading information.

I was able to talk to Mary. She told me that she was angry that Shelia had appeared to accuse her of entering inaccurate information regarding the student's test score. Mary felt that her relationship with Shelia had been damaged by the incident. Mary acknowledged it was a 'glitch' in the RTR system which had caused the conflict, but nonetheless she had become less sure of her Shelia's judgment due to the incident:

> *Mary – I know that no one did anything wrong deliberately but I'm really unhappy about what happened.*
>
> *A.C – So in your view Shelia should have contacted you first, asked you what had happened with the data entry?*
>
> *Mary – Yes I do. On e-portal I wasn't presented with any options that reflected what had happened – there wasn't an option saying something like 'Absent, School match' which I could've entered. So what was I supposed to do? And I was teaching all day on that day and had to change sites at break time. I didn't have time to check my emails until after school. And yes I could've looked at them at lunch but I was exhausted. I had my three most difficult classes one after another and I have to use all my energy for them. I wanted to have my lunch and just get my head straight. When I change sites at break that means I don't get a break that day - I'm driving form one site to the other and then I have to set up my room for the next lesson. And then I'm confronted by a colleague who's having a go at me for something that's not my fault. We've become more and more tech reliant and that's fine, but it's putting a whole new load of pressures on us.*
>
> (Mary Physical Education teacher – Interview, KS4 staff room, after school)

Also emerging from the RTR data set was what teachers called the 'appropriateness' of using text to contact parents. As Nicola suggested, she was not critical about using texting *per se,* however, a message sent via text could be seen as lacking a gravitas and importance:

> *Nicola - Texting is great I use it a lot. But what does it mean using text to contact parents about stuff like truancy? I think it really devalues what's trying to be said. Use text to communicate events, football results and even the end of year exam results, but I don't think we should use it just because we can. It needs to be thought about.*

A.C. – But texting is such a part of everyday life now. Doesn't it make sense to use it?

Nicola – Yeah, but only when it's appropriate. I don't think sending a text saying 'your kid's not in school today' is right. The text message isn't about that. Texting is about what time you're going to be somewhere, or what the football score is, or how long you will be. It's a social thing. A school communicating to a parent about a child's non-attendance by text just isn't appropriate.

A.C – So a phone call?

Nicola – Or even an email. I think email would be fine as that's become more of an 'official' form of communication.

(Nicola – Interview, KS4 staff room, lunch)

An observation I made of Michelle appeared to support Nicola's concern about texting parents. I observed Michelle having to deal with an email which a parent had sent in response to a text from the school:

Michelle had set up the main activity for her period 2 Year 10 class - the students were working on their TPCs. Michelle was at her desk looking intensely at her TPC screen and called me over as I was in the room setting up a practical for my next class. She showed me an email she had just received from one of the parents. Michelle was the Significant Other Ambassador [SAA, see Chapter 5] *for the parent's daughter. In the email the parent was asking where Michelle thought her daughter was as she had received notification from the school, via text, that her child was marked absent. The parent's email outlined how the girl had left home at 7.45, and despite living only a 10 minute walk from the school, she had been marked absent by the period 1 teacher. The parent also complained that the text message she received had contained only a short message saying that "Your child has not been present for period 1 today" and that this brevity had both worried and confused her.*

Michelle immediately emailed the period 1 teacher to ask if the student was in his class. The teacher emailed back after 10 minutes to say that he had made a mistake with the attendance data entry and marked the student absent when she was present. On receiving this information Michelle wrote an email replying to the parent acknowledging the mistake had been made. She explained that as soon as data was entered onto e-portal it became live in the school's intranet and that the RTR support manager had received information that the student was absent.

The RTR database mediated identification of the student's mother as wanting text notification of her daughter's absence. Michelle indicated in her email that the RTR manager had used the correct RTR message from the message bank, and that the message had said that the student was absent. Michelle apologised for the error, and also for the brevity of the text message.

The entire process took around 20 minutes from receiving the parent's email to sending the apology. Later in the day Michelle told me how stressed she was by the situation, However, she also had to continue to support her students in their own learning - Michelle was not able to leave the class to attend to the parent's email as no one was available to take the class for what might be an undefined period of time.

(Michelle, Science teacher – Observation, KS4 science lab, morning)

Nicola had shared an experience similar to that of Michelle on two occasions and was uncomfortable with texting parents for just this reason:

> *Nicola - I've had to deal with upset parents because of a text message being sent. There's just too much opportunity for confusion because the messages are so short.*
>
> (Nicola – Field note, KS3 staff room, after school)

The potential for misunderstanding text messages was supported by April's concerns regarding the accuracy of information used in RTR. April suggested that some teachers were already positioning the RTR as inaccurate – as she commented, "the last thing RTR needs is more confusion" stemming from misunderstanding, which she claimed, arose from information being communicated via text:

> *April – Technology is supposed to help with communication isn't it? I know that when I receive some texts and emails I'm not always absolutely sure what's being said. I'm not sure that texting parents about kids being absent are a good idea at all. There's too much chance for confusion.*
>
> (April, Humanities teacher – Field note, KS4 staff room, lunch)

As Nicola indicated, teachers were not against the use of texting in certain situations but the school needed to ensure that information which was being sent was accurate, and the message unambiguous:

> *Nicola - If we're giving parents' access to real-time data, and if that data is being communicated to parents, then it has to be right. I don't think we have major problems with data here, I think it's pretty accurate. But if we're setting ourselves up as real-time then that data has to be correct. I'm not sure that just because we can give access to data because of technology this means that it's in the parents and kids best interest to do it.*
>
> (Nicola – Interview, KS3 staff room, before school)

Nicola was also concerned with the cost not just of RTR, but also the wholesale spending on educational technologies at the school. For Nicola there was a sense of confusion as to what the spending on technologies such as TPCs, LCDPs and RTR was supposed to achieve:

> *Nicola - From what I can see we've had to spend a load of money on a server, and also employ someone to administer the whole thing. But what's been achieved? I really think that a lot of the money that's spent here is in a show,*

to put on a good face to the public, and to show how great we are and the Government is.

A.C – So are you saying that this money shouldn't have been spent on ICTs?

Nicola – Not all of it, no. There's about 25 grand's [thousand pounds] *worth of computers in each room. Now what could some of that money been spent on? Even if we had half the amount of machines, that would add up to thousands of pounds that could be spent elsewhere.*

A.C – Like on what?

Nicola – Poverty doesn't have a lot to do with technology. Computers don't help some of the kids we have here who don't know what they're going to eat of an evening, or if their mum's going to be in, or drunk, or stoned. What's technology got to do with that kid?

A.C – You seem to be talking about wider social issues. The school can only do so much…

Nicola – Of course! But if we spend the money better, on things that will help some of the most vulnerable kids, then we are doing something to help.

A.C – So are you saying technology doesn't help vulnerable kids?

Nicola – No, what I'm saying is that just giving kids access to loads of computers is not a magic wand that'll sort out all the problems. RTR's been advertised like that and it isn't. We've relied on technology as a great big plaster to cover up the real problems. Think how many teachers we could employ if we spent the money differently. £25,000 is a starter salary for a teacher. We could have smaller class sizes, or keep the really good and experienced teachers in the classroom by paying them on the management scale. The amount of money that's been spent on technology in this school just doesn't add up.

(Nicola – Interview, KS4 staff room, after school)

Nicola's comments were also supported not only by Bob, a member of the support staff:

Bob – That amount of money that's been spent on this school, and technology, is incredible. Really, if you think what schools used to be like, and then look at this one, it's amazing. I'm concerned though. Just throwing computers at the kids doesn't help…actually they can do the opposite as they can distract if they're not used well. There're so many social problems the school has to face I think some of the money that's been spent on 'wizzy' technology could've been spent on smaller classes, more support teachers…more teachers.

(Bob, Science technician – Field note, KS3 prep room, morning)

Rashid however had a very different view:

Rashid – We must spend money on technology. The world we live in is all about technology. We can't turn our back on it. To give these kids the best chance to get jobs, to be successful, they must be 100% confident with computers. It's a global economy and we've got to help them to be part of it.

(Rashid, SLT, Field note, SLT office, after school)

There was a distinction between what teachers, and support staff, said about the amount of money spent on technology at the school and those members of SLT I spoke to. For example, two senior leaders I spoke to echoed Rashid's comments:

> *Jo – The technology we have here is so much part of what we do as a school. It's not an add on…technology is central in the kids, and staff, experience. Without technology this would be a very different, and in my view, less effective school.*
>
> (Jo, SLT, Interview, SLT office, after school)
>
> *Clive – Computers aren't just about effective learning, although that's obviously a major factor. Every penny we spend on a bit of kit is about aspiration, and the future, and giving people a better chance. Technology isn't just about learning how do use a programme, or an application, it's about us making a commitment to the kids here. It's fundamental.*
>
> (Clive, SLT, Interview, SLT office, after school)

For Jo and Clive, the school would have been negligent if it had not invested in the levels of technology in the way it did. Both these teachers were adamant that technology mediated an improved educational experience for Brampton's students. This position was not completely in contrast with that put forward by Bob. There difference between these informants' views were not related as to whether technology should, or should not, be bought - they all maintained tha it should - the differences came in what they considered should be the *amount* of money that had been spent, and whether this money could have spent differently.

RTR analysis: stage 1

My grounded theory analysis of Nicola's RTR data presented two distinct 'families'. The first family was related to dialogue and legitimacy. Nicola talked about freedom of information being a concept she strongly believed in. And yet her experiences of RTR suggested that just giving access to information without a process of considering the consequences, mediated a detrimental impact on the relationships between her and parents. Nicola felt that RTR was positioned as mediating a meaningful dialogue between parents and her. However, her concern was that such a dialogue could not be meaningful if based on incomplete and inaccurate data, which only told 'half the story'. The result of this was that Nicola reflected on the discomfort

she experienced through being associated with a system which was seen as unreliable and untrustworthy.

Part of Nicola's discomfort stemmed from her feeling excluded from vital parts of the RTR process. For example, she did not know which parents had subscribed to the RTR scheme and there was no indication as to which data was being accessed by parents - the efficiency of 'live' communication central to RTR, disempowered teachers. Nicola commented that RTR resulted in her feeling 'left out of the loop', particularly in relation to sensitive information regarding lateness or truancy. However, disempowerment represented more than Nicola feeling 'left out' because of the efficiency of a new technology. The concern she raised was that RTR seemed to be positioned as a self-determining system that had a transformational agency ascribed to it. Consequently, Nicola felt disempowered by RTR and was concerned about some of her colleagues over reliance on the system – over reliance which led to conflicts between her and some of her colleagues who she felt had abdicated their responsibilities.

The second family of concepts were those such as 'devalue', which related to the appropriateness of using texting as a means of communication between school and parents. Nicola made reference to the use of texting as being an inappropriate means of communicating what might be potentially serious and confidential information. She talked about texts as lacking 'gravitas' as a communication medium as texting was seen as primarily a means of informing someone about relatively minor events. The concern Nicola raised was that a text could lead to misunderstandings. She talked about a text message potentially resulting in a situation where a parent might experience trauma because of an inaccurate, inappropriate or confusingly brief message. Nicola acknowledged the popularity of texting as an effective and widely used form of communication and how often she texted in her own social life. However, it was just this frequency of use which Nicola identified as a concern she had for text. Texting was considered as a 'social' technology, and as such the content of text messages were usually of a social nature. Nicola deemed using text to contact parents about a possible serious incident as inappropriate. The issue was not that text was an ineffective means of communication, indeed quite the opposite; it was how fitting it was to use it for communicating between a school and parents in some situations.

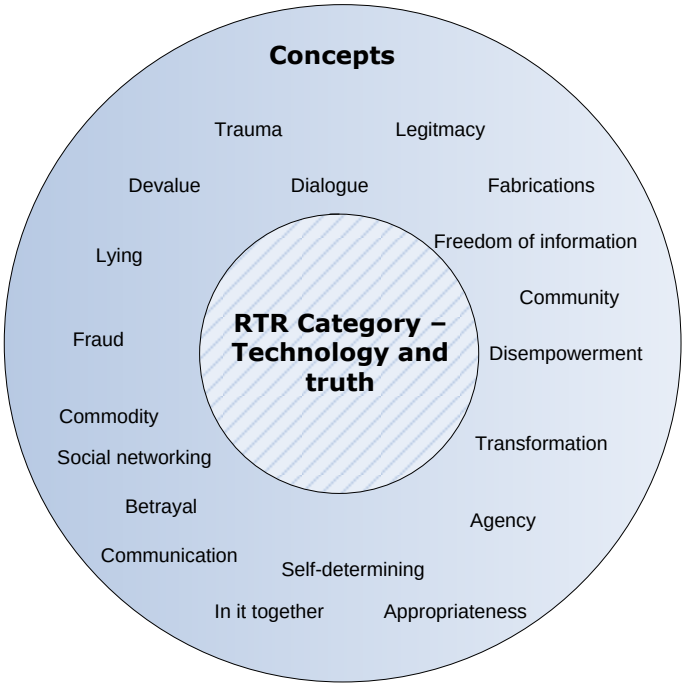

Figure 4.3 Micro-level analysis of RTR data

As can be seen in Figure 4.3, from examining the concepts in Nicola's RTR data I developed the category of 'technology and truth'. Recurring in the data was that the aims of the RTR system, particularly the positioning of data as live and accessible online by parents, did not necessarily paint an accurate picture of what was happening in the school. Nicola suggested that RTR appeared to be a system put into action because the technology was available to do so. She went onto described the context surrounding RTR in terms of "we've got the kit, then we had to think what we can do with it". Rather than RTR being part of a strategic process leading to a new communication system, Nicola suggested it was created as an outcome of technological capability. The upshot of this lack of strategy was that the effect of RTR mediation on the processes of reporting lateness and attendance appeared not to have been considered. Data became seen as untrustworthy and glitches in the RTR system caused tensions and disputes between Nicola and some of her colleagues. Tensions were also highlighted for her regarding the financial investment in technology. The school's SLT appeared to be fully committed to the spending with the justification that the school would be less effective without it. Nicola was more sceptical. Nicola was adamant that she was no technophobe and that there should be no technology at the school – Nicola's view was that

although technology had an important role to play, the large investment in it could have been directed toward other parts of the school.

As indicated in Table 4.2, the categories which emerged from Nicola's data were also prominent in that generated by other informants. For example, as Nicola commented on how technology mediated conditions of truth at the school, both Sammy and Eve also identified this as a concern. Technology mediated a version of the truth which appeared beyond question, despite the possibility that the data it relied on being fabricated or inaccurate.

RTR Category	**Technology and Truth**
Concepts	**Analysis**
Truth	Technology, and technological systems, represents a version of the truth – not 'the' truth. Technology is positioned as beyond question, although the data it relies on might be fabricated or inaccurate.
Legitimacy	The legitimacy of technology as a 'cure-for-all-ills' – for example, the legitimacy of the data used because of errors, the legitimacy of certain technology as communication between school and parents; the legitimacy of the amount of spending on technology.
Fabrications	The increasing need for data to justify the success of the schools has led to a culture where data is produced, and 'fabricated' to reflect these indicators.
Community	Technology has mediated on the communities of teachers through being a tool of performativity. Technology supports the positioning of teachers as competitors rather than colleagues through a data-culture
Disempowerment	Technology has disempowered teachers by de-skilling and the reduction of direct face-to-face contact. Disempowerment results in teachers relying on RTR.
Appropriateness	The use of 'social' media had redefined norms of communication. Confusion arising because of a disconnection between the method of communication and the information being communicated.
Spending	The amount of money invested in technology enhances its status as a medium representing a true representation of the school. In actuality mistakes in data entry, and the fabricated nature of the data, are ignored because of the large financial outlay.

Table 4.2 Macro-level analysis of RTR data

Eve's issue was that the demands put on teachers resulted in inaccurate data being entered into the school's systems, either by accident, or deliberately so as to conform to the performance culture. Eve maintained that although computer mediated systems were seen as reflecting a modernised and professional approach to portraying the school this was not necessarily the case in practice. For her, the notion of schools, and teachers, fabricating data

was a concern for her and seemed the antithesis of what she considered a professional approach to education.

Eve's concerns resonated with a number of other informants who questioned what was being portrayed as the truth. Ozzy, Kevin and Michelle all highlighted similar concerns to Eve's as to how much of a truthful representation was being mediated by RTR technology, and how this mediated tensions between community members. Such tensions were reflected in my observation of Shelia and Mary, where RTR technology mediated sometimes inaccurate and confusing messages being communicated to parents. Kevin indicated that there appeared to be an overreliance on technical systems and data at the school. This was a view which appeared to be supported by Craig, Adam and April who discussed how they felt disempowered by the technology which mediated RTR. Craig for example talked of how he experienced a lack of ownership toward certain responsibilities because of what he considered as the technology mediated these tasks resulting in a process of deskilling.

Like Craig, Sally, had concerns about the appropriateness of some of the technology. Indeed, Sally's concern was that some technologies were inappropriate for mediating RTR, with texting being one example. However, Sally's main worry was that parts of the RTR process had been 'taken over' by computer mediation, and as a consequence she felt that part of what she did as a teacher had also been taken over. The discussion around appropriateness was also part of the wider issue of spending. Bob for example, maintained that some of money spent on computer technologies could have been spent on other things. This was a position contrary to that of Rashid, Jo and Clive who all indicated that the school almost had a moral obligation to spend as much money as it could on educational technologies.

RTR analysis: stage 2

The prominent tools mediating the RTR activity were the Internet, TPC, and SMS text. The subject of the activity was Nicola Harvey. The object of RTR was to enhance the communication between the School and parents through empowerment, shared ownership and the opportunity for engagement. The transformational process of the RTR activity resulted in the outcome of improved communication and dissemination of information between the School

and parents. The rules that supported the RTR system related to the protocols for data entry, the privacy of those parents who opted into the system, and the security of data stored on the RTR server. The RTR community consisted of teachers, parents and guardians with the division of labour between teachers and NS staff. Although divided amongst community members, the divisions of labour resulted in Nicola spending more time regarding technical issues which reduced actual time communicating with parents.

Nicola was supportive of the objective of the RTR system to empower parents to engage with their children's education. Nicola was keen to integrate a 'dialogue' between the school and parents with the expectation that this would result in an environment of greater ownership. The school as an organisation, led by SLT, were committed enough to RTR to set up specific technological process and tools as well as support the system with NS staff. Moreover, the school was quick to publicise this new and innovative use of technology in a school setting.

The direct use of RTR was hidden from Nicola due to the security firewalls on the Learning Gateway. Nicola acknowledged the system had to be secure, and that parents should be confident that their engaging with the RTR data was confidential. However, this security disempowered Nicola and resulted in her feeling being 'left out of the loop'. The consequences of this was that she disengaged with the RTR process and became resentful when she had to address queries, problems and conflicts which arose because of parents' access to RTR data. The RTR system was technologically well resourced. Nicola was particularly complimentary toward the 'integration' of data from different parts of the school. However, Nicola was concerned with the prevalence of inaccurate data and the consequences of this data becoming 'live' to parents accessing it via RTR. The period of time between data being entered onto e-portal, and parents' accessing it did not allow a crosschecking of data.

As with tensions which arose through RTR, Nicola was also concerned with the appropriateness of using texts to communicate RTR data to parents. Nicola suggested that not only did the use of text 'devalue' the potentially serious nature of the message content, but the text format also led to confusion. Nicola accepted that texting was ubiquitous with some communities within

the school. However, she indicated that texting had mediated potentially damaging instances of communication, and relationships, between teachers and parents at the school.

RTR Discussion

The technology mediating RTR, specifically the Learning Gateway resulted in a number of challenges for Nicola. For example, Nicola advocated parents accessing information. However, the school's management did not appear to have considered the implications of this. The technical possibilities resulting from the processing power of the Learning Gateway portal led to Nicola having an enhanced capability to contact parents, and to mediate parents contacting her. Similarly with texting Nicola was in a position to use SMS as a means of communicating with parents. Whilst these tools mediated the object of Nicola's participation in RTR, there were some tensions which arose - tensions which ultimately appeared to reduce, rather than enhance communication between parents and her.

Not only did these tools create conflicts between Nicola and some parents but also conflicts between Nicola and some of her colleagues. The RTR community included teachers and parents who shared the object of increasing the ownership of, and engagement with, information. However, issues with the accuracy of data which parents accessed brought into question RTR. The RTR system was mediated by rules and tools, which facilitated real-time access of data. However, it had not put in place protocols which ensured the accuracy of that data. The tensions between Nicola and some parents because of inaccurate data, and confusing text messages impacted on her participation in the RTR community.

The divisions of labour in RTR increased the amount of time teachers were required to spend on disseminating information to parents. RTR was initiated as a system which would not put any additional demands on teachers' time. The data used in RTR was already being generated and analysed by teachers so RTR was mostly a system mediating parents' access to this information. However, teachers were contacted frequently by parents regarding incorrect or misleading information. Moreover, teachers also spent time in meetings with colleagues regarding queries raised by parents accessing RTR.

I have represented the RTR activity system in Figure 4.4 and have indicated a contradiction between tools and community which prevents Nicola from attaining her object. This contradiction is reflected in the complex interrelationship between the object of RTR, the tools that mediate the activity and community.

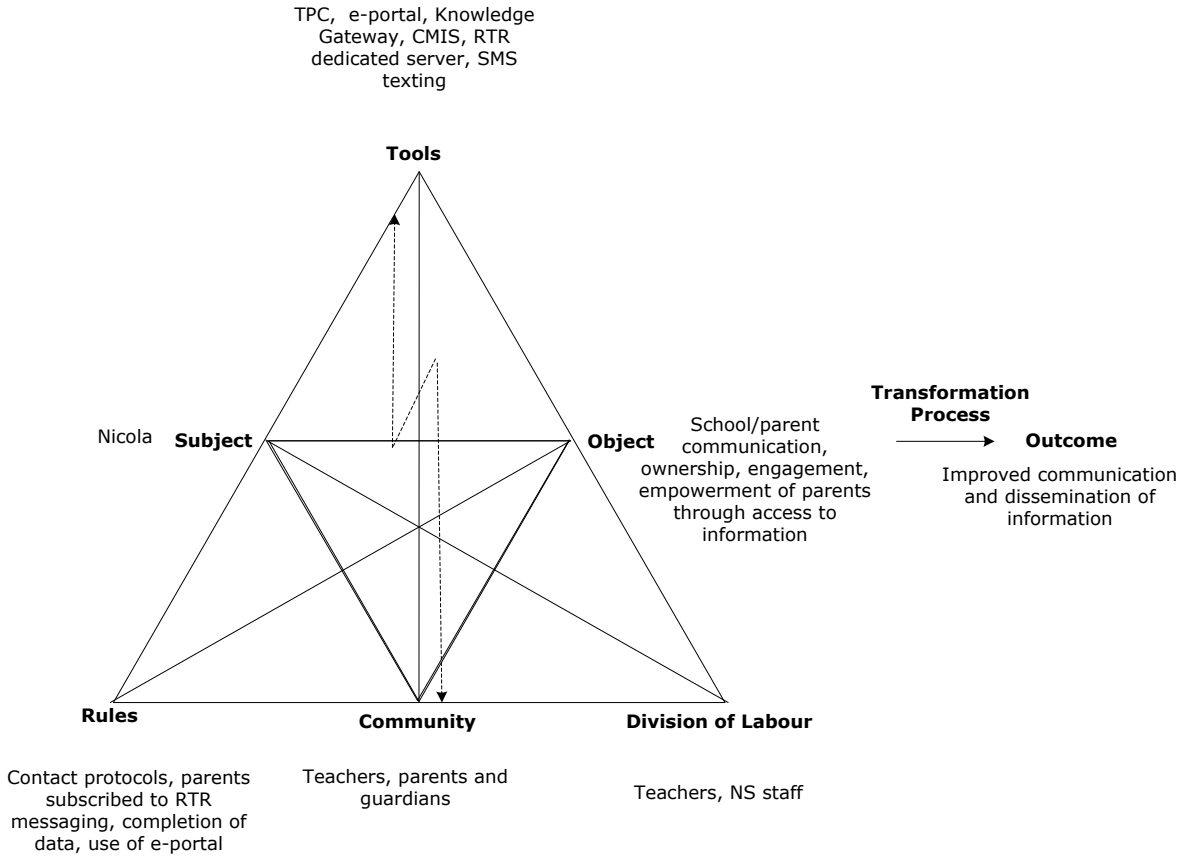

Figure 4.4 RTR activity system

RTR has the object of implementing a communication structure between Nicola and parents which leads to ownership, engagement and inclusion. The tension in the RTR system arises because the tools used to mediate the RTR process are inappropriate for the task, and rely on inaccurate information. The community (teachers and parents) loses trust in the system, which in turn causes conflicts between members of the community. A further source of conflict in RTR resulted from the high level of access required to enter the system. Nicola felt that she was not a part of RTR and therefore did not always engage with it or the tools and data which mediated it. Consequently, some of the actions and procedures, which should have been followed in relation to attendance and truancy, were not completed which resulted in the object of improved communication between Nicola and parents was not being attained.

The technology in RTR resulted in tensions between Nicola and some parents. Parents were receiving messages based on inaccurate data which led to confusion and distress and which was compounded by the 'informal' nature of texting - Nicola claimed that using text to inform parents regarding truancy or lateness was inappropriate because it 'devalued' the message. In this case, texting prevented the RTR object of giving parents ownership of information because the mode of information delivery was not appropriate for the type of information being sent. Despite parents being given the option to give texting as the preferred method of communication the 'ethos' which surrounded texting – as informal communication - did not appear to sit with the nature of the information being sent.

4.3 Summary of key themes chapter 4

In this chapter I have positioned Nicola Harvey's data into my analysis. I have identified two different activities which Nicola took part in, and which had educational technology as prominent mediating tools. I have developed the context which surrounded Nicola's use of technology through grounded theory and identified the components of the MAM and RTR activities – tools, subject, object, rules, community and the division of labour – which together formed activity systems.

Identifying concepts and categories in Nicola's data was located in her experiences of using technology in her activities. From triangulating different concepts I have developed two overarching categories – 'technology and trust', and 'technology and truth'. For example, I have examined how for Nicola the use of technology mediated a contrived collegiality which eroded communities. I have also discussed the implications of these eroded communities as reflected in Nicola's isolation, and self-doubt. I have highlight the effect of educational technology mediation on trust, relationships, and the individual, and how different informants rehearsed how they felt les trusted, and had fewer professional relationships. Similarly, I have explored how Nicola suggested she been disempowered by educational technology.

I have developed models of two activity systems and identified contradictions in those systems which have been inferred from the tensions in the activity systems. In the case of MAM the contradiction was between tools (in the form of ROF and LCDP technology) and community, for RTR the contradiction was between tools (e-portal and SMS) and the subject. I have examined the consequences of these contradictions on Nicola's ability to attain her object. I have explored how these contradictions manifests in different tensions. I examined how an over reliance in technology led to distrust and resentment within parts of the MAM community, and how the technology which mediated RTR resulted in tensions between Nicola, her colleagues, and some parents.

Chapter 5: Positioning David Sharma

Synopsis of Chapter 5

In this chapter I identify two of David's activities, the Performance Management Review (PMR) and the Significant Adult Ambassador (SAA) model of pastoral care. In the first part of this chapter, I present the data set relating to David's experiences of being both reviewee and reviewer in PMR, and discuss how technology mediates the activity whilst seemingly increasing teachers' already high stress levels. The concepts I establish from the PMR data lead to the category of 'technology and control'. I identify how David finds it difficult to control the technology which mediates PMR, whilst experiencing the PMR process controlling him and his practice. I then develop a model of the PMR activity system. The prominent tools which mediate PMR are TPC applications - the Touch Screen Electronic Visual Display (EVD), and Graphical User Interface (GUI) Drop-down Lists (DDL). From analysing my PMR activity system model, I suggest a contradiction between tools and object.

The second section of this chapter focuses on SAA. I establish e-portal and Windows Live Hotmail (WLH) as the prominent technologies mediating SAA and develop the category of 'technology and relationships'. I discuss how the supposed efficiency of relocating the school's pastoral care system within the context of the curriculum has reduced the opportunity for students to engage in a non-academic support structure. I establish my activity theory analysis of SAA and identify the SAA activity system. I examine e-portal and WLH in the SAA system, and focus on how these tools have not just mediated the school's pastoral care model, but have significantly changed what constitutes such care. I position a contradiction in the activity system between the subject of the SAA activity and the object. This contradiction is reflected in the tensions between David's view of pastoral support and the model suggested by SAA which prevents him from attaining his object.

5.1 Performance management review

The Performance Management Review (PMR) was introduced when the school first opened in 1994. As part of PMR, all employees at the school were required to have a meeting with their immediate line-manager to review and assess performance over the previous twelve months. Technology was central to mediating PMR, with the review managed via the PMR section on the Learning Gateway. Implicit in PMR was that the review was positioned as a support for members of staff who were struggling, whilst also giving 'high fliers' the chance to be recognised. Explicit in PMR was the issue of pay, as staff members were informed that any pay increase was reliant on the review.

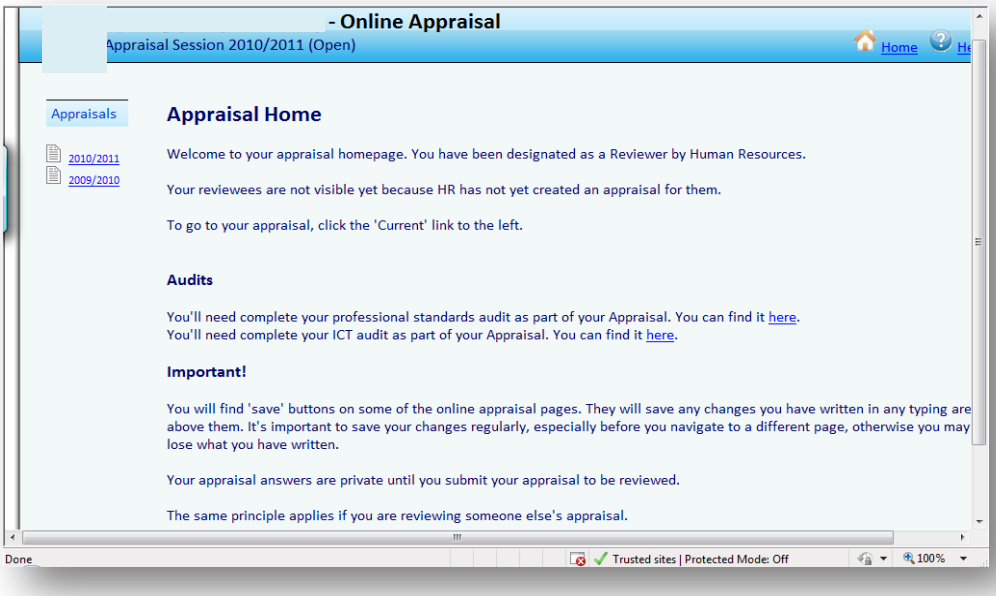

Image 5.1 PMR front page

PMR began with an email being sent to all members of staff informing them of the person who was to be their reviewer, and allocating a pin-number that mediated access to the PMR section of the tab on the Learning Gateway (see Image 5.1). Entering this pin-number revealed a document divided into 17 sections. Each of these sections had a box with a DDL containing 7 different statements - the reviewee chose one to answer the question which headed the section. For example, teaching staff were asked in section 7 how they 'developed learning and teaching in your classroom over the last 12 months'. The DDL provided statements ranked on a 'Likert scale' where 1 indicated the greatest success and 7 the least success.

Central to PMR was that the answers to these questions were measurable. Consequently, the reviewee needed to produce quantitative evidence which supported their answers - teachers had to demonstrate that they had achieved the targets agreed during the previous year's PMR with their reviewer. There were three new targets agreed in light of the reviewee's answers to the PMR questions. For teachers, one of these targets was related to the performance of individual student groups, one to the teacher's personal development, and one to the teacher's contribution to the whole school.

As part of PMR all members of staff had a CPD session which described changes in the PMR system, outlined the timeline for completion, and gave examples as to how the different sections might be answered. There was a two-week window for completion of PMR from the time the reviewee received the initial email, to the reviewer entering the completed form onto the Learning Gateway. After the reviewee had completed the PMR online an email was sent to the reviewer alerting them this initial stage had been completed. A date was then set between the two members of staff for a face-to-face meeting where the reviwee's comments were discussed and possibly amended by the reviewer. The three new targets were similarly discussed and agreed and the previous year's targets reviewed. The reviewer then sent a completed version of the reviewed form, along with his or her comments, to the Human Resources (HR) department. After collating by the HR department, each PMR was reviewed during a meeting of the school's Governors. After this meeting, a letter was sent to members of staff informing them of their success, or otherwise, and the pay-rise they would receive for the next 12 months.

The assessment of PMR was supported by the inclusion of a lesson observation (completed in the 12 months since the last PMR). This observation was graded using OfSTED marking criteria - part of PMR was mediating a staff discussion forum relating to any issues from this observation. The school had a member of staff, the Teaching Standards Officer (TSO), whose role it was to carry out these observations and report back to the faculty leader, and indeed the senior leadership team, any concerns about a staff member's performance. Teachers who were unsuccessful in their PMR were supported through a range of intervention strategies. However, not meeting any of the three targets was not seen necessarily as a cause for an

unsuccessful PMR. Often targets were 'rolled over' to the next year to give teachers the opportunity to successfully achieve them. However, if a teacher failed to meet their targets and had an unsatisfactory grade on their lesson observation, then this was seen as a more serious indicator of a member of staff requiring support.

There were two prominent technologies mediating PMR (both of which are accessed via the TPC) - the Touch Screen Electronic Visual Display (EVD), and the Graphical User Interface (GUI) Drop-down List (DDL).

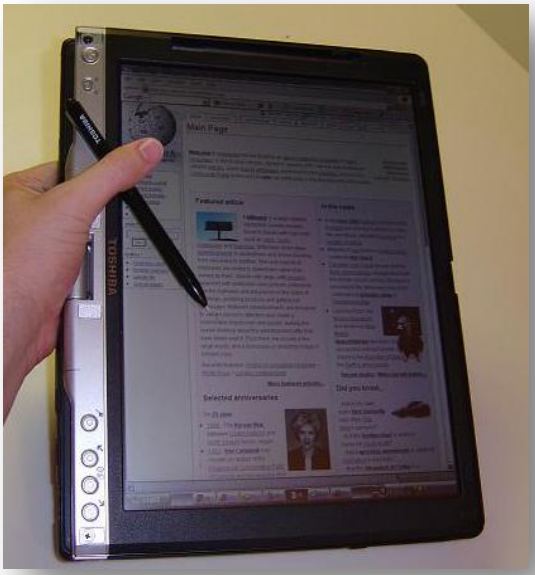

Image 5.2 Toshiba EVD and tablet pen

The TPC EVD detected the presence and location of pressure within the display area – see Image 5.2. The EVD could be touched either with a finger or a laptop pen which mediated the user to interact directly with what was displayed on the screen. The EVD removed the need for an external peripheral such as a 'mouse' to indirectly control the cursor. The EVD in PMR mediated the data entry process. Teachers used the TPC pen to touch the EVD to enter data onto the PMR database. The EVD displayed a GUI DDL. A GUI is a type of computer interface which mediates the user to interact with a program through visual icons instead of text based messages. A DDL is a GUI 'widget', when the DDL is inactive it displays a single value, when active it displays a number of values from which the user may select one. PMR data entry is a

process of selecting statements from banks displayed as DDL. The reviewee picked the statement which most coincided with her answers to the PMR questions.

I observed David conducting a PMR with Tanya who was a member of the Science faculty (both teachers had given permission for my presence in the meeting):

> *David's role was as facilitator, particularly with regard to the discussion of Tanya's targets from the previous year. Tanya had emailed David with evidence (test scores and residuals) indicating that her previous year's targets had been achieved. David had accessed this data prior to the PMR meeting and had completed his part of the PMR. In the meeting itself, David was supportive with regard to Tanya's achievements and spent time developing the list she had submitted cataloguing her achievements - the PMR appeared a co-constructed process where David reinforced the data submitted by Tanya.*
>
> *Using the DDL statement banks led to some challenges in the meeting. Both teachers discussed their own comments regarding the PMR questions, and then 'fitted' the closest statement from the DDL into the PMR document. The DDL statements were designed to make the process quicker and more efficient. However, because of the generic nature of the statements there was not a precise match between the two. The PMR document did however allow Tanya to submit a word processed answer to the PMR question which supplemented the DDL statements.*
>
> *Technology was prominent in PMR, with both teachers constantly using their TPC throughout the meeting, and with the entire data entry process being completed via the Learning Gateway. However, there were some tensions arising from this technology. For example, both teachers frequently saved data, as there was a distrust of the PMR document on the Learning Gateway. Rather than solely using the PMR document, both teachers cut and pasted statements into a word document which they saved elsewhere from the Learning Gateway (both teachers used USB 'flash' storage drives which they had bought themselves). This had an impact on the amount of time the meeting required as the constant 'backing up' of data resulted in both teachers having to minimise the PMR page on the screen and save data into a separate document elsewhere.*
>
> *There were two occasions when the PMR data entry screen 'froze'. David indicated that this was a common glitch in the system. To overcome this both teachers closed the PMR tab, and then re-opened it to mediate a new data entry session. This process required both teachers to re-enter their identification pin-number. The use of the TPC pen led to a considerable number of inaccurate data entries due to the small size of the DDL boxes on the TPC screen. Because the statements in the DDL bank were relatively long, they extended past the normal view of the TPC screen. David indicated that teachers became used to the statements and did not have to read them in entirety to know which one to use. However, it was still easy to accidentally click on the wrong statement in the DDL. Rather than use the TPC pen, both Tanya and David used a wireless mouse for data entry.*
>
> (David and Tanya, Science teacher – Observation, KS4 class room, after school)

David's PMR data set highlighted the technological mediation of the school's performance management model. David supported some form of performance management system for teachers. However, he was concerned that PMR did not reflect all that teachers at the school did. David was troubled that the use of DDL reoriented the focus of PMR from a holistic review of a teacher's strengths and weaknesses to a data, and target, facing process. David talked with warmth and fondness about the levels of commitment and professionalism teachers at Brampton exhibited. However, he was frustrated by PMR in mediating them:

> *David - PMR supports teachers. Well it used to. Now, as it's so focused on targets and target setting, I don't think it really supports teachers at all. What's happened is that it's encouraged teachers to bend the truth, to 'play the game'.*
>
> *A.C – Play the game…*
>
> *David – I don't mean make things up, what I mean is to use the rules of the system. A teacher isn't going to put low scores in the PMR so what does the use of the data mean?*
>
> *A.C – This is important then, why don't the ranked statements reflect what's happening?*
>
> *David – Because low scores might prejudice a pay rise…what should be happening is that people should be rewarded, not punished, for highlighting weaknesses. Instead everyone plays the game.*
>
> (David, Interview, KS3 class room, before school)

Here David talks about playing the game of tactical agreement – what Gleeson and Gunter (2001, p. 149) call 'strategic compliance' - and that technology mediated PMR to become more process than outcome driven. David was also frustrated by the PMR almost completely relying on 'hard' data:

> *David - When I do PMR now there's no real room for a dialogue between the person I'm reviewing and me. I have to respond to what they've written in terms of set criteria, which is about hard facts and figures. This system doesn't allow for any of the issues, which are actually the important story. What if a teacher has been given a lot of low ability classes?*
>
> *A.C – So are you saying that there's two things going on…that PMR is becoming more about 'hard' data, and that technology is the tool that's making it like that?*
>
> *David – The technology is key in this - with the DDLs there's less room for context, the back-story. The DDL statements were broached as a means of making PMR quicker. But that was before the statements were ranked. The only reason we've gone to the DDLs is that the whole CMIS system requires data. PMR is just following that model.*

(David – Interview, KS3 class room, before school)

David's comments were supported by Louis, Cheryl and Chris:

Louis – The school's becoming more data-driven and we have to produce more data. The computer systems, the MIDYIS, YELLIS, CMIS all use hard data. But is that because that's the best way to represent what's going on, or is because that's the way computers work?

(Louis, Mathematics teacher – Field note, KS4 class room, break)

Cheryl – PMR is all about the system, about computers and data as much as it's about my performance. I've been here 10 years now and I was dead against any performance management at first. But when it's done well it's good. It's supportive. But over the last couple of years it's become so data driven…it's all about test scores and targets. It's not about me…it's not about me as a whole teacher.

(Cheryl, Languages teacher – Field note, KS3 class room, lunch)

Chris – I think I get on pretty well with most of the kids. But where's that in the spreadsheet? There isn't a box that's ranked from 1-7 about happiness in my classes, or fun, or laughter, or relationships. These things aren't there…they're disregarded.

(Chris, YLL – Field note, KS4 class room, lunch)

All of these teachers considered a form of PMR as desirable - however, the model used at the school was too process and outcome driven (particularly in terms of targets) to reflect a reasonable review of teachers work. Avril talked about the use of the DDL statements:

Avril – Who's going to rank themselves with 6 and 7? I'm not. But if I'm struggling with something, performance management should support me, be part of my professional development as much as performance. Setting up a computer system where statements are ranked helps with the data but does it help with the people?

(Avril, HOF – Field note, KS4 office, before school)

Avril was concerned that using statement banks which were ranked could reflect on the teacher being reviewed, concerns echoed by David:

A.C – What about the statement banks?

David - The statement banks were put in to make the PMR quicker. But ranking them was a bad idea, as people immediately think that the ranking of their answers reflects on them.

A.C – Well don't they?

David – They do but that wasn't the idea. The whole idea of data consistency in CMIS was that the PMR carried out by HOF A should be the same as by HOF

B. When we discussed the statements at SLT there wasn't some ulterior motive to rank teachers. The statement banks were honestly about making the meetings faster and then having more consistency across the school.

A.C – But it hasn't turned out the way you thought…

David – No. As soon as we put a number against the statements, and the statements were clearly in a scale, then that changed the whole focus of the PMR. What was designed to be technology supporting an existing system ended up with technology not doing that at all - it was like the technology changed the focus of PMR.

(David – Interview, KS4 class room, break)

For David, technology mediated PMR to become less focused on who the teacher is, and more on what data represented them as being:

David - Data only tells one part of the story. I can think of at least five teachers here who will struggle in their PMR because of poor numbers [module test scores etc] *and yet are dedicated, hardworking, and most of all, really caring about the kids.*

(David – Field note, KS4 class room, break)

David's view on the increasing importance of data in PMR was shared by Ray:

The thing is what is data? When I'm talking about PMR, that's data, so is the context which is part of who the kids are. Is that in PMR? I don't think so. I think that PMR is becoming all about evidence and outputs and that means that stories are left out. We used to be focused on targets that were as much subjective as objective…now PMR has become about crunching numbers and measurable targets. I don't know how much of that is to do with focusing on that stuff is better than not…or how much is to do with how PMR has been set up.

(Ray, Technology teacher – field-note, KS4 Staff base, before school)

David insisted the data in PMR also missed the hidden parts of teachers working lives. His concern was that it was just these hidden parts, the 'extra-mile' which was essential to the school. David claimed that PMR had negated the informal non-identified work of teachers. For David, the demands of PMR to evidence practice had begun to unravel the voluntary, egalitarian parts of being a teacher:

David - What teachers do in lunchtime, after school, in the corridor is so important. The informal discussions, you know, "well done on the last piece of work" or "and your homework is where?" are what holds the place together.

A.C – And that's not acknowledged?

David – It's acknowledged in the meeting. But the spreadsheet doesn't give the opportunity for that to be entered into the quantitative data part.

A.C - So because the technology demands data in one form, as something that's quantitative, things that are hard to quantify aren't acknowledged.

David – Yes, they aren't acknowledged not because they're not important, all of SLT know how important these things are, but because the computer systems can't easily store them as data.

(David – Interview, KS3 class room, after school)

David claimed there was a link between the technology mediating PMR, and what PMR had become. As the technology mediating PMR had grown in complexity so too had the requirements of PMR. David gave an example of how the PMR tab on the Learning Gateway had become increasingly susceptible to crashing and losing data. David's comments were supported by my own observations of the PMR tab being used:

Despite it being almost 6 o'clock, the staff bases were full of teachers attempting to complete their PMR forms before the deadline. Although the time window for the whole process was 2 weeks this put a lot of pressure on teachers. Not only did they have to evidence their achievement of the previous year's targets, but they had to complete the on-line session, and arrange a face-to-face meeting with their reviewer.

I watched for about 10 minutes in each staff base before moving on – I went into 4 bases in all. Of the 24 teachers I saw, 4 suffered a data-entry malfunction whilst I was observing. What appeared to be happening was that teacher's TPCs would crash, data would be lost, and the TPC screen would freeze. The only way to address the issue was to perform a hard-reboot. This was done by unplugging the PSU and removing the battery whilst the machine was switched on. When the machine was restarted the teacher had to go through the entire log-in process again, both for the Learning Gateway, and for the PMR entry page. A rough estimate put it at about 5 minutes from a machine crashing to it being available for data entry.

Of the teachers who did not suffer a complete crash, there were frequent occasions of TPCs crashing momentarily – in which case the most recent data entered was lost. All the teachers I observed complained of the slowness of the intranet system.

(PMR data entry – Observation, KS3 staff base, after school)

The recurring comment was that the PMR tab was unreliable. This had a major bearing on the time PMR took, as instead of saving just to the PMR tab, teachers constantly 'backed up' their data. David described the process:

David - I tell teachers to do all their comments in a word document before even opening PMR [on the Learning Gateway]*. The whole idea of making PMR intranet based was to make it more efficient but as the system has become more complex it's also become more fragile.*

(David – Field note, KS3 staff base, lunch)

Mo recounted how his machine had 'frozen' on three different occasions and as a result his work was lost on all three occasions – as confirmed by my own observation of him working:

> *Mo was on the final entry screen of his PMR. He was in a staff base with 5 other teachers; it was 5.52 on the Thursday before the PMR deadline the next day. Despite the atmosphere in the room being one of quite concentration Mo suddenly shouted "No"! At this, one of the other teachers, Sandy, asked "has it crashed" to which Mo replied "Yes". Sandy asked Mo if he had backed-up his data entry. Mo replied that he had been doing so but had become engrossed in his work and had not backed-up for about 20 minutes. Mo said "I've lost the last 20 minutes of my work. I can't face any more of this; it's the second time today". Mo looked extremely upset by what had happened…he unplugged his laptop, performed a hard re-boot by removing the battery, put the TPC in his bag and left the staff base.*
>
> (Mo, Science teacher – Observation, KS3 staff base, after school)

I interviewed a member of the NS team, Warren, who told me that the reason the PMR tab kept crashing was that over time the increased requirements for data, larger numbers of staff at the school, and the shortening of the data entry window, overloaded the PMR data entry tab on the Learning Gateway. Warren also told me that the NS team advised staff using the PMR tab to back up their document after each data entry:

> *Warren – The intranet can't handle everyone trying to enter their data at the same time. We're trying to sort it but the same things keep happening…everyone using Wi-Fi to enter data into the* [PMR] *database at the same time. The two week timeframe has made it really hard. Of course if all the staff were entering the data over the entire two weeks it would be OK. But because it takes time to upload the data, and the PMR tab is only live for two weeks a year, the server can't handle it.*
>
> *A.C – Can't the tab be open all year so that staff can complete their PMR when they want to?*
>
> *Warren – That'd be the obvious answer. But then the PMR tab would need managing over the entire year rather than just two weeks. I suppose it's a case of resources. As PMR has become more data heavy, like the link between the DDL statement and CMIS, it's actually becoming quite a complex system to manage.*
>
> (Warren, NS – Interview, NS office, after school)

David insisted the challenges of using the PMR tab were more than just technical:

> *David - PMR has become more and more complicated. It relies more and more on teachers evidencing their practice with hard data and then developing targets. The more complex PMR becomes in relation to the technology it needs, the more complex the process itself becomes.*
>
> (David – Field note, KS4 staff base, lunch)

The crashing of the PMR tab, and the use of the TPC for data entry, led to errors. David's comments echoed those of Nicola in relation to integrity of data entry used for RTR. For example, David talked of how he had bought his own wireless mouse to aid with the data entry process:

> *David - Using the tablet pen is just too difficult. The statements that need to be highlighted are too small to see easily, and it's so easy to touch the wrong one with the pen. When you make an entry the list disappears and you go onto the next question. All you see is the number. So you can't check what statement you clicked without opening that window again. The whole thing takes a long time.*
>
> *A.C – So the complexity of the system has ended up with the whole PMR thing taking longer?*
>
> *David – Yes. It's interesting though because having PMR intranet based was a god thing. It really helped teachers to reflect on what they'd done over the last year. As it's become more complex though PMR is taking longer, the data entry takes longer and there're more mistakes. That's why I don't use the tablet pen anymore. It's so easy to click on the wrong statement.*
>
> *A.C – You use a mouse?*
>
> *David – Yeah. That doesn't sound like much but when you're travelling from site to site, and teaching in different rooms, it's just one more piece of equipment. I never used to use a mouse but I do now. I have to carry it around with me, and it's just one more thing I've had to buy to do my job.*
>
> (David – Interview, KS4 staff base, after school)

The amount of time the PMR data entry took was recurring in the data. Whilst I imagined this to be annoying, it was only after one conversation with David that I began to understand why he particularly raised this concern:

> *David - Lots of teachers find PMR really stressful. People's careers depend on it, and pay is linked to it. So, if a teacher has spent a long time on their PMR statements, evidencing their targets, and then thinking of new targets, and the portal crashes then that's really stressful….so many teachers I do PMR with say that it's one of the most stressful things they do all year. Then there's the added worry of the technology not working.*
>
> (David – Field note, KS3 staff base, before school)

In Cyril's view, PMR had ceased to be supportive instead becoming technology laden and stressful - the complexity of PMR was representative of a controlling system rather than a supporting one:

> *As PMR has become more and more data-driven it's all about controlling teachers. Performance management is something that's come from business anyway. It's easy when you're looking at sales figures, or cars made, or cans*

of Coke sold. But performance in this school is about stuff that can't be easily measured like trust and relationships. I just feel that this PMR system is about controlling us through technology.

(Cyril, Law teacher – Field note, KS4 staff base, after school)

David maintained that the highly regulated and process driven PMR model challenged some of the very outcomes PMR was supposed to achieve. David's comments suggested that technology has mediated PMR to reflect a fabricated version of events at the school where performative technology is primarily concerned with manufacturing (Ball, 2001, p. 216). For David, the technology which mediated PMR (the DDL and PMR portal) led to a system which manufactured data complementary with the demands of the system. What David called playing the game was also discussed by Katie:

Katie - We are all under pressure to evidence the targets we've been set. I just think that all that happens is that people starting playing the game…they teach to the test I suppose.

A.C – So playing the game is just that, focusing on the boxes to be ticked and ticking them?

Katie – I think so. The more PMR is about performance, the more performance is what you will get. The only trouble is that performance will only be in the areas which are important. My performance isn't measured in terms of how many kids have a laugh in my lessons because how do you measure that? And even if you could what does that show…I'm good at telling jokes.

(Katie, mathematics teacher – interview, KS3 room, lunchtime)

David also experienced tension between being a member of SLT (and therefore an advocate of the school's policy decisions) whilst simultaneously having concerns with PMR. He claimed that statistically evidencing performance through targets engendered at best a compromised view:

David - I just really wonder if PMR helps at all. I'm a person who wants to get to the point. I'm not afraid to talk plainly about something. PMR is just not like that because it supports people who play the game, who can make the numbers work for them, whilst hammering those who can't.

A.C. – What is the SLT view then?

David – We have to work in the parameters we're given. The board of Governors put pressure on the Head to produce results, and these results are all about exam performance. What we've tried to do as SLT is to set up a system that's as fair as possible. We know that 99% of the staff work as hard as they can and are really committed professionals. What we tried to do was get technology to support these people in recognising their achievements.

A.C – You don't seem sure it's worked?

David – No. I think that what's happened is that the technology has not just slotted into the previous systems and made it a bit better. The technology has changed the whole PMR thing…so people now give the system what it wants.

(David – Interview, SLT office, break)

David was also concerned about a 'distance' between values he held as the implicit rules of being a teacher, and the values of being a success in relation to PMR. For David, PMR had evolved into a symptom of what was wrong with both Brampton, and teaching as a whole:

David - I think there's a real tension between where teaching is now, and the job I started out in. When I think about what drew me into teaching in the first place and what I have to do now they're miles apart. When I first started here, PMR was part of supporting teachers, now it's part of controlling them.

(David – Field note, KS4 staff base, after school)

David's comments were ones of values. He was suggesting that the values which underpinned PMR were in tension – or 'splitting' (Ball, 2001, p. 215) - with his own values, and which brought into doubt the object of PMR:

David - PMR used to be about a professional dialogue. Now it's like a pretend conversation. Of course both people sit down in a room and talk about targets, but they're targets which are part of a system aimed at performance, specifically exam performance. There's nothing about things we can't measure like joy, fun, love, stuff that was so important to me when I first started. We can't measure how much fun there is in a lesson so it's not important any more.

(David – Field note, KS4 staff base, after school)

Sian also spoke of a splitting between her values and the demands of PMR:

Sian – When I think about what I became a teacher for, and then think about what being a teacher is now, and there's a big split between them. My performance is important to me…I want to be the best teacher I can. I don't think that just because I can use data in a spreadsheet that proves how I'm performing. It doesn't do that at all. It shows how well I perform at ticking the boxes.

(Sian, Technology teacher, KS4 staff base, after school)

David's point about fun, joy, and love, in other words the emotions of being a teacher, was a recurring theme. David claimed these emotions had disappeared from the teaching lexicon at Brampton - the questions which the reviewee had to answer, and the targets which had to be achieved, had no place for such emotions. David's claim was that, as PMR had become more technology mediated, the aims and objectives of the system had changed. David also talked about how central to PMR was a visible 'actioning' of targets. Like David, Carl suggested that

the reviewer was also under pressure to complete successful PMRs and suggested that unsuccessful PMRs were "bad for morale":

> *Everyone has a vested interest in PMR being successful. SLT aren't out to 'get' people they are trying to manage. Lots of people having unsuccessful PMRs isn't going to help anyone, perhaps the technology is about making it easier for everyone to do well.*
>
> (Carl, History teacher – Field note, KS3 staff base, lunch)

David's concern was how this pressure for PMR success impacted on the relationships, which 'cemented' the school together:

> *David - As a critical friend* [critical friend is the system of SLT support for middle managers] *I talk to Faculty Leaders (FLs) about the PMR's they've done. What's so obvious is how many of them really regret how they've approached it.*
>
> *A.C – In what way?*
>
> *David – The PMR interview is one which FLs need to think about carefully. Teachers might feel vulnerable and then might become defensive. It's really important to focus on the positives as a way of supporting the challenges.*
>
> *A.C – And that's changed?*
>
> *David – I think it's really easy with the data heavy approach to PMR to lose sight of the human being sitting in the room with you. It's almost as if the technology has become the focus and not the people. I've found myself being captivated by the data-entry screen, wondering if it's saved my data, rather than being in the moment and listening to what's being said. I have to be very aware of that.*
>
> (David – Interview, KS4 staff base, after school)

Similar to this issue of regret, David talked about how PMR was part of a competition culture. David claimed the competitive nature of PMR had an inevitable impact on relationships, community and a common purpose:

> *David - The other day I was walking through a staff base and I overheard a conversation which really shocked me. It was between two new members of staff talking about a colleague in their department who had struggled in their PMR lesson observation. One of the teachers said, "it's terrible, but thank God it wasn't me that failed". And I thought to myself she's just said what everyone else thinks.*
>
> (David – Field note, KS4 staff base, after school)

David went on to talk about how PMR had become increasingly contrived; particularly the process of data entry and the use of DDLs. David's comments reflect a 'symbolic existence' (Jeffery & Woods, 1998, p. 106) – PMR was more symbolic of a fabricated and performative

culture than one reflecting teachers' strengths and weaknesses. David claimed that rather than a culture of creativity and choice, PMR engendered one of apportioning blame and finding fault. Like David, Max agreed that explicit in PMR was that there was room for improvement in everyone's practice.

> *A.C – What are your thought about PMR?*
>
> *Max – It's one of those things which is a great idea but has lots of problems in practice. I think we need PMR. I also think that using technology as we do makes the system better. I'm not sure though where it's going to end.*
>
> *A.C – In what way?*
>
> *Max – It's like we've got more and more targets, expectations, standards to complete…and I suppose that's part of what PMR is. It's also become more like a completion. The whole ethos has moved from that of being the best teacher that you can, to showing that you are as good, or better, than others.*
>
> *A.C – So PMR has become part of competition?*
>
> *Max – It seems like it. I have to evidence that my groups have achieved their targets. But there is an assumption that all the classes grouped in the ability levels are the same and that's just not how it is. I'm not saying that I shouldn't try to improve all the time. I can always improve…we all can. I don't think though that if I achieve my targets with a class and another teacher doesn't that I'm better though.*
>
> (Max, Science teacher - Interview, KS3 Science Lab, after school)

Neither Max nor David was suggesting that the perfect lesson or the perfect teacher exists. However, the constant need for reappraisal, development and progress, appeared to be the prime object of PMR, and was reflected in David experiencing guilt and self-blame – what Lortie (1975, p. 144) describes as the 'bitter taste of failure'. As David indicated:

> *David - If someone has a bad PMR I really take it personally. I don't think that anyone who chooses to work in a school as challenging as this is going to be lazy, or has a bad lesson on purpose. What PMR does is it just completely ignore the human side of a teacher, it ignores the person.*
>
> (David – Field note, KS3 staff base, break)

David was adamant that PMR had objects of control and surveillance. For David, the pressure of PMR completion rendered PMR in the same mold as an OfSTED inspection, and with some of the same consequences. David commented that the demands of work, and particular the demands of a successful PMR, caused tensions between teachers' home-life and work-life balance:

David - It's so easy to lose sight of what's important. What with OfSTED inspection, learning walks [learning walks are when SLT members make formal lesson observations]*, faculty lesson observations, MAM meetings and PMR, work can become the only focus, the most important thing.*

A.C – The balance isn't right?

David – No I don't think so. We are all being asked to do more with data, to use technology more for evidencing what we do and less for learning. As I've said before, there're more things to do but only the same amount of time to do them. Something's got to give.

(David – Interview, KS4 staff base, after school)

David was similarly concerned with the effects of PMR on teachers as human beings and not just as production units to be managed effectively. David talked about control, truth and particularly, how PMR appeared to have control over professional practice, and over who teachers felt that they were.

PMR analysis: stage 1

The concepts which emerged from David's PMR data suggested that technology had mediated changes to the objective of the activity. For example, what David called the hidden parts' of teachers lives were not acknowledged in PMR, nor were the voluntary and egalitarian activities in which he regularly participated. Analysing David's data indicated that there was a tension between his values which positioned PMR as a supportive and positive activity, and the highly technologically mediated model of PMR, which represented a 'competition culture', which for him was neither supportive nor positive.

This splitting of personal values with the institutional values which defined PMR, were for David part of the increased culture of fabrications. David's view was that DDLs mediated PMR as a means of control as opposed to support, and the ranking of the DDL statements outweighed the importance of his own personal statements. Because PMR was based on targets and the ranking of DDL statements, the technology designed to mediate David's PMR by making it easier and quicker to complete, had in effect redefined the model of performance management itself. The importance given to 'hard' data in PMR, and technology in mediating the generation and analysis of such data, had refocused David's view of PMR from supportive and inclusive, to judgmental and managerial. For him, there was a relationship between the increase in complexity and technological mediation of PMR and the stress he experienced participating in

PMR. For example, David's constant 'backing up' of data led to the PMR process being increasingly time consuming and complex. His distrust in the PMR tab heightened the anxiety David felt and impacted negatively on the PMR experience for him.

The technological challenges David experienced relating to PMR data entry manifested in a number of tensions. For example, David claimed that the school's management saw a criticism of the technology mediating PMR as a lack of commitment to the school. This led to a culture of what David called 'clandestine voices', where teachers were not comfortable about openly criticising technology for fear of their concerns being seen as a criticism of PMR, and by extension, the school. David identified a link between teachers' professionalism and an expectation being expected to 'battle on regardless' with the difficulties of PMR and, for him,, resulted in PMR being seen as part of having to 'play the game'. In David's view, the reliance on targets and statistical data in PMR engendered a culture of strategic compliance, where he simply assimilated the constraints of PMR in acquiescence to the demands of the review process.

The regular reconfiguration of the PMR tab on the Learning Gateway was also significant, with David unclear as to the advantages of this constant change. I observed David in two rounds of PMR, and in both cases the DDLs containing the PMR statements were changed in their appearance and operation (the statements themselves remained the same). Moreover, the dialogue boxes indicating OK, cancel or exit commands were redesigned and repositioned on the PMR page. This reconfiguration was compounded by the difficulties David had with accessing DDL on his TPC. The stress he felt when using the PMR tab heightened David experiencing feelings such as failure and guilt - he claimed stress from PMR was complicit in affecting his home life- work life balance.

The PMR tab (despite being on the Learning Gateway) was not accessible from the Internet, and consequently David could only enter data when he was physically located in, or near, the school's buildings. However, the fragility of the PMR tab led to David staying late at school, or coming into school on Sunday mornings, to access PMR at a time of low e-portal traffic and thus less likelihood of it crashing and losing data. Indeed, David recounted how on one

occasion he drove to school late one evening knowing he could not gain physical access to the buildings. However, he was able to log-on to the Learning Gateway because the school's wireless cloud extended into the car park. David parked his car and completed his PMR data entry in the school car park.

Examining the concepts emerging from David's PMR data, led to me developing a category of 'technology and control' which can be seen in Figure 5.1 and which had two subsets. The first of these related to David's ability to control the technology mediating PMR. The recurring technical issues with PMR data entry led to an already potentially stressful activity becoming more so. This was reflected in David purchasing a wireless mouse to reduce inaccurate data entry. The regular backing up of data, and the use of software such as Microsoft Word in which to save data rather than rely on the PMR tab, indicated issues of David's trust in the system.

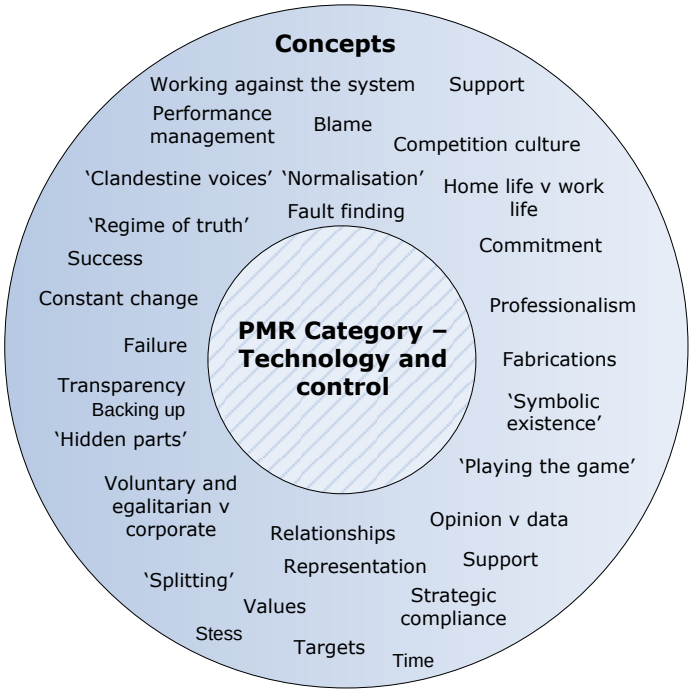

Figure 5.1 Micro-level analysis of PMR data

It is important to remember that David's pay was reliant to an extent on PMR – in his view, the technological difficulties undermined the importance of PMR in relation to teachers' careers and salaries. That David did not feel in control of the technology which mediated PMR established the process as being difficult to use and hard to trust. The stress of data entry linked with a

distrust of the PMR tab only heightened his resentment and destabilised the importance of performance management.

The second subset of the control category related to David feeling PMR was part of a 'regime of truth'. Hard data and evidenced targets reflected a change in PMR from support to assessment. David maintained that the reliance on data, and particularly the ranking of DDL statements, instead of mediating transparency in his practice, portrayed a symbolic existence of playing the game and strategic compliance. David felt that he had difficulty in controlling the PMR process because of the affordances of the technology mediating it, and that PMR had become more of a tool for controlling him and his practice. The inflexibility in the DDL statements, and the inaccuracy in mapping these to the David's own comments, 'short-circuited' a vital part of the data entry process. David's concern was that the opinions of teachers were not sufficiently prominent in the PMR – he experienced PMR as both hard for him to control, and increasingly no more than a tool for controlling him.

In table 5.1, it can be seen that the seven concepts which emerged from David's data resonated with data generated by other informants. Like David, Cyril was concerned that PMR had become increasingly part of a technologically mediated control culture. The highly technical PMR model mediated a shift in the underling objects of the activity – from supportive and professional to controlling and data-laden. Cyril's view was that using technology so prominently to mediate the evidencing of targets through data could easily be central to controlling his practice. For Cyril, 'ticking the boxes' meant that what, and how, he taught was to an extent directly mediated by the technology used to evidence his performance. Cyril's comment resonated with those of Max who highlighted how PMR had become increasingly mediated by technology, and in doing so, was inherent in a wider environment of direct comparison between faculties and teachers. Max's view was that inherent in PMR was a competition culture which was based on technology mediating an increasing importance placed on data.

Underpinning the concepts of control and competition was how the technology mediating PMR relied on data – and how statistical analysis of such data could portray a fabricated view of the

school, faculties and teachers (see Karl's comments). The rules of data entry, such as DDLs, mediated PMR outcomes in terms of ranked statements. Such a model encouraged teachers' achievements to be reflected in a small set of criteria which themselves were part of a wider, and fabricated, view of the school mediated through technology and data. The concept of fabrication was also central to what Katie called 'playing the game'. For Katie, PMR had become so mediated by data and technology that it ceased to portray an accurate version of her performance. Katie's view was that PMR required – and to a degree encouraged – that teachers provided the data the system required. In doing so, much of what Katie considered as fundamental to what she believed being a teacher was, fell outside of what was required for PMR.

PMR Category Technology and Control	
Concepts	**Analysis**
Control	The highly technical PMR model has mediated a shift in the underling objects of the activity – from supportive and professional to controlling and data-laden.
Competition	Inherent in PMR was a competition culture which was based on technology mediating an increasing importance placed on data. Evidencing success in terms of targets was located in a wider setting of comparison between faculties and teachers.
Fabrications	The rules of data entry, such as DDLs, positioned PMR outcomes in terms of ranked statements. Such a model encouraged teachers' achievements to be reflected in a small set of criteria. These criteria were part of a wider, and fabricated, view of the school through technology and data.
Playing the game	Teachers would use the constraints of the technological system to represent their achievements through the ranked statements – this encouraged a feeling of PMR being a process of fabricated reporting rather than accurate reflection.
Splitting	The demands of the technologically enhanced PMR system manifested in a splitting between teachers' personal values and the demands of a technological system
Data	Data had become more prevalent with the increase in technology mediating PMR. The evidencing of teachers' achievements are through an attempt to achieve greater consistency via data stored and communicated by technology.
Work/home balance	The demands of the PMR process have become increasingly technology, rather than object, driven. Consequently, the technical difficulties arising through the system impacted on teachers' work-life/home-life balance.

Table 5.1 Macro-level analysis of PMR data

Katie's concerns regarding 'playing the game' resonated with what Sian who identified the demands of PMR manifesting in the splitting between her personal values and the demands of the system. Splitting is an important concept here as it reflects an environment where technology mediates teachers such as Sian to reconsider her own fundamental beliefs. Sian's

view was that the data which was required to evidence PMR success had very little to do with what was happening day-to-day in her classroom. Consequently, data became 'manufactured' for the sake of PMR evidence, not as representing students' learning (see also the comments of Louis, Cheryl and Chris). For these teachers, data had become more prevalent with the increased levels of technology mediating PMR.

The centrality of data in PMR led to the final point, that of teachers work life/home life balance. My observation of Mo's frustrations at e-portal crashing reflected a deeper consequence of PMR. Because of the constraints of the technology mediating PMR, the data entry window was over a short period of time. This had implications for the school's intranet system and resulted in teachers staying late, or coming in especially make data entries. In practice, the high level of technological mediation inherent in PMR did not appear to reduce the amount of time some teachers had to commit to completing it. Indeed for Mo the opposite appeared to be the case – the fragility in the technology resulted in him having to spend a proportionately larger amount of time on the data entry process, than on generating data, completing the PMR pro-forma, and having the face-to-face meeting with his reviewer.

PMR analysis: stage 2

The prominent tools in the PMR activity were the EVD function of the TPC, the PMR tab on the Learning Gateway and the use of GUI DDL widgets. The subject was David Sharma. The object of PMR was to support and motivate David through a reward and sanction model of performance management leading to improved examination results. The rules which supported PMR were related to the timeframe for completion of the spreadsheet, and the use of the PMR tab (containing the DDL), and the reviewer receiving the reviewee's PMR and the face-to-face PMR meeting. There were also rules concerning the support of teachers who were unsuccessful, and the reward of teachers who were successful. PMR rules also stipulated the precise nature of the three targets agreed for the following year, and the assessment of the targets set for the current year.

The PMR community included every member of staff in the school. The head teacher's PMR was completed with the Chair of Governors, with every other PMR following this model of direct

line-managers carrying out the review. The division of labour was initially between the reviewer and reviewee. This division was then extended depending on the outcome of the review. If successful, the review was sent to the Governors' committee for approval. If unsuccessful, the member of staff's immediate line-manager was supported by members of SLT to formulate an intervention strategy.

My analysis of the PMR activity system indicated that the technology mediating it had a significant effect on David's experiences of performance management. For example, David claimed the constant updating of the PMR tab and front page became an exercise in technological advancement rather than in response to the needs of users. Moreover, the technology mediating David's attainment of the PMR object resulted in tensions and conflicts between what he expected the system's tools to do, and what they did in practice. For example, the difficulties David faced with data entry in PMR, reflected similar challenges in other activities where the TPC EVD was used for this task. The GUI DDLs which were designed to increase the efficiency of data entry resulted in a mismatch between available statements and the data David wished to enter. Moreover, the DDL statements heightened David's concern that the targets which underpinned PMR had resulted in the DDL statements being part of a ranking of teachers. Consequently, David claimed he was more likely to answer the PMR questions with DDL statements ranked 1-4 rather than 5-7.

Despite the prevalent technology mediating PMR, there were time management implications of the system. David's distrust in the PMR tab successfully saving data resulted in multiple data entries. David saved PMR data external to the PMR tab through the use of an external data storage device (bought by him). The process of multiple data entry had implications for David's time management. Due to the PMR tab being located on the Learning Gateway, every time a save was made the PMR tab had to be exited and the data saved into another document. The constant opening and closing of the PMR tab resulted in data entry taking a significant part of the 1-hour time period allocated to the PMR meeting.

David's distrust of the process for entering and saving PMR data was reflected in increased stress. PMR was stressful for both reviewer and reviewed and the culture of backing up PMR

data added to this stress. The PMR tab on the Learning Gateway was becoming increasingly unreliable with David's machine crashing frequently during the data entry process. The school's NS team identified the cause of the crashing as the increasing demands on the Learning Gateway (particularly the use of CMIS to centrally store the school's data appeared to result in an increased fragility in the PMR tab). David was also concerned that the increasing focus of PMR on data was not representing accurately teachers' performance. As PMR became more data driven, so too did the requirements for this data to be quantitative. Whilst David accepted that examination performance was a central part of the school's focus, this focus has seemingly replaced qualitative data in PMR.

PMR Discussion

Technology had a central role in mediating PMR. Specific tools, such as the EVD application of the TPC mediated data entry, and the DDL defined the parameters for David's responses to the PMR questions. However, specific challenges arose for David when he used these tools. For example, he found using the touch screen application of the EVD made the data process more complex than when using a mouse. The small size of the data entry boxes in the DDL made accidentally clicking on the wrong box easy. The consequence was a relatively lengthy process for amending the mistake, which involved scrolling back through pages of the PMR tab, reactivating the DDL, clicking on the inaccurate data entry, and then clicking on the correct DDL statement.

The TPC pen David used to touch the EVD had a 'click' button in its barrel. Depressing this button mediated text dragging across the screen in the same manner as using the buttons on a mouse. This was a function which aided PMR data entry but which was outweighed by the ease of accidentally clicking on the incorrect DDL statement. Moreover, the interactive function of the TPC EVD meant that if David inadvertently touched the screen this resulted in the computer mediating a command, for example, scrolling to another page. Consequently, the highly technical nature of the EVD appeared to result in extra levels of David's work. David was one of many teachers who chose to purchase their own mouse for their TPC rather than use the EVD application for data entry.

David was also frustrated by the lack of access to the PMR tab from the Internet. Although the PMR tab was located on the Learning Gateway, due to the increased amount of data and the corresponding enhancement of security, he could only log-on to PMR when physically within the school's wireless cloud. Not being able to enter data other than at school extended the time David took to complete PMR as the PMR tab frequently crashed with the high traffic demand. Because he was unable to enter their PMR data on-line on the Internet, David chose to stay late on one evening to complete data entry.

The fragility of the PMR data entry resulted in changes to other instances of David's working practices. For example, the division of labour, whilst seemingly divided between teachers, managers and governors, actually reflected a far greater workload on the teachers involved in PMR. The backing up of data significantly increased the amount of time David spent on the data entry process. David claimed that merely backing-up and entering data constituted at least 50% of the entire PMR process. Due to David's concerns regarding the frequent crashing of the PMR tab, he purchased his own USB storage device onto which he saved PMR data. The limitations of the PMR technology appeared to have significant meditational role in David's experiences of being both reviewer and reviewee.

The PMR rules that stipulated the data entry window placed excessive demands on technology, and caused the system to frequently crash. Positioning PMR solely as an on-line activity accessed via the Learning Gateway led to David facing frustrations. For example, David was troubled by the instability of the PMR entry tab and the restrictions on data teachers could enter in support of their targets. Similarly, the rules specifying what data was used to evidence David's performance appeared to redefine the object of the PMR activity. The technology mediating PMR reflected the importance of evidencing targets with quantitative data. The rules of the PMR system which made technology the prominent mediating tool, redefined the object of PMR from reflecting a holistic view of David's work, to being narrow and technology laden.

The object of PMR was to support and motivate teachers at the school, with the increased technologicalsation of PMR designed to increase the efficiency of the process. However, despite David being a supporter of a form of performance management, the object of PMR appeared to

be in conflict with different components of the system. For example, the object of the system was in conflict with the tools mediating the system and manifested in tensions between subject and object. The demands on David to complete the data entry process, whilst ensuring the integrity of the data by completing a backing-up procedure, put additional demands on him. These demands were not passed onto other members of the community. Prior to the increased meditational role of technology, the division of labour involved in PMR was equally distributed amongst the community; the consequence of increased technology was a parallel increase in the demands placed reviewer and reviewee.

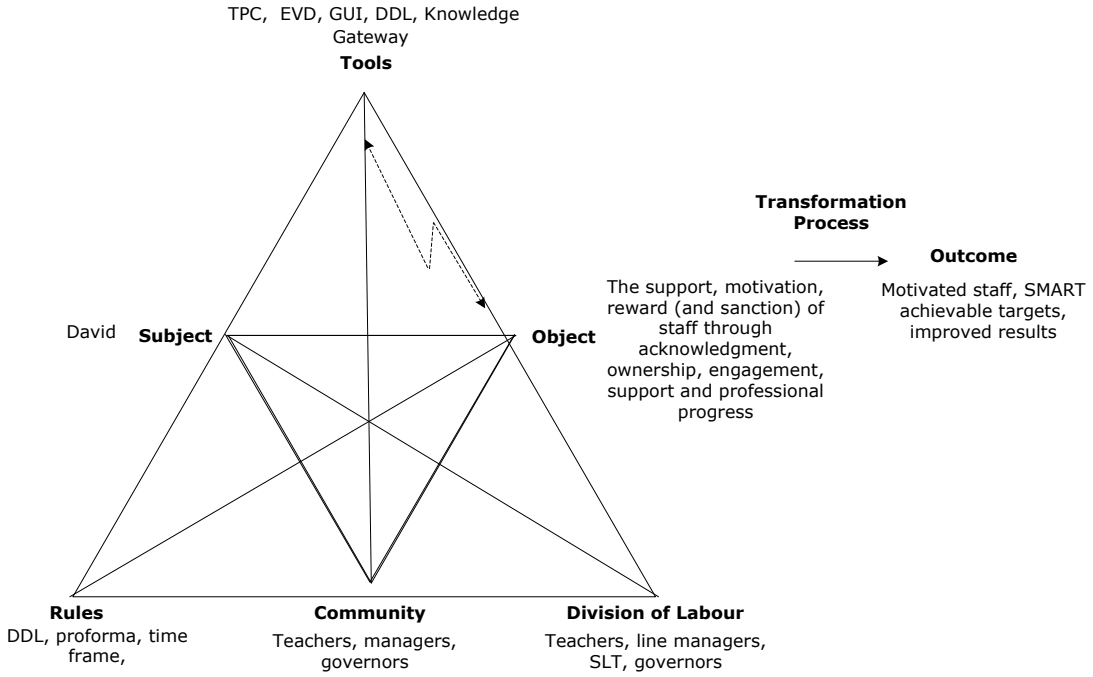

Figure 5.2 PMR activity system

Figure 5.2 represents my model of the PMR activity system - I have identified a contradiction between the tools used to mediated PMR and the object of the activity. The tools in the PMR contradiction highlight perhaps some of the challenges facing the school's performance management system. The UK Government's Green paper Teachers: Meeting the Challenge of Change reflected a 'sophisticated' (Story, 2000, p. 509) approach to educational performance management. However, even this model faced systemic challenges due, in part, to its inability to identify and recognise some of the 'important realities of schools as complex organisations' (Story, 2000, p. 509). The contradiction in the PMR system appears in part because of the difficulties in performance management systems in schools.

The technology used to mediate PMR, the Learning Gateway, TPC and GUI DDLs reflected the increasing sophistication of PMR. However, the very sophistication of these tools added to the stress David experienced when participating in the activity. Moreover, the technology mediating PMR (the ranking of DDL statements, and the increased use of statistical data to evidence targets) was reflected in tensions between the object of the activity i.e. motivated and target driven teachers, and the tools which mediated the activity. For performance management to be successful it needs to have the flexibility to manage a whole range of conditions whilst, as Armstrong (1993, p. 79) suggests, being 'properly designed, installed and maintained'. The difficulties of data entry via the TPC and David's resultant distrust of the PMR tab suggested that the tools mediating PMR were not properly designed, installed or maintained.

The PMR object focused on support, motivation, engagement and improvement. However, a system which claimed engagement and ownership as objects and yet also included sanction and punishment appeared in a state of conflict. Similarly, there was tension between the implications of a system which encourages fabrications, and the moral and ethical rules which David might have held. An example of this tension was the design of the PMR pro-forma which had a significant meditational role in PMR. Because of the nature of the questions on the pro-forma the reviewee had to give statistically evidenced answers.

Central to the PMR contradiction was that the activity did not have an application which acknowledged the time David spent preparing lessons, nurturing a caring environment, or mediating an atmosphere of fun in his lessons; as such it had essential flaws. The technology in PMR mediated the data which became prevalent in representing David's performance and, consequently, mediated David's ability to attain the object of the activity. Rather than PMR being a worthwhile and supportive activity, it had become distrusted, stressful and based on information which failed to recognise significant parts of David's activities.

5.2 The significant adult ambassador

The Significant Adult Ambassador (SAA) was implemented for the beginning of the 07-08 academic year at Brampton and was part of the school's commitment to the Every Child

Matters (ECM) green paper (DfCFS, 2004) drafted in lieu of the Victoria Climbié case (Victoria Climbié was subjected to systematic abuse which eventually resulted in her death. Her abuse was missed by a number of agencies). SAA was part of the school's model of 'pastoral care'. Pastoral care describes practices and approaches supporting young people's well-being:

> …the hierarchical structures and tasks assigned to specialists and other teaching staff within the school, the caring approach to those tasks including relationships and the overt curriculum in the form of taught elements such as Personal, Social and Health Education. (Calvert, 2009, p. 269)

In the SAA model, a teacher had pastoral care responsibilities for a group of students on both the lower and upper school sites, and across key stages. This rendered physical face-to-face meetings of the group impossible, due to the geographical distance between buildings. Consequently, the SAA tutor group did not exist in a physical sense, and the students who shared a significant adult did not necessarily know who else their SAA was the significant adult for. The initial SAA protocol was that this group would consist of students who the SAA tutor had taught in curriculum time. However, this proved to be too complex in terms of timetabling, and teachers became the SAA tutor of students they had never taught. The SAA system was a major reorientation of Brampton's previously traditional pastoral care system which consisted of groups of students meeting together for tutor periods.

Computer technology was a vital part of mediating SAA. For example, students were contacted via email if they needed to be informed of events. In SAA, the responsibility for contacting students about non-curriculum matters was removed from the tutor, and became the responsibility of a dedicated team of SWOs and LSTs - the level of support offered to students significantly increased as a result of SAA. There appeared two main drivers behind SAA. First, teachers had the pressure of tutorial responsibility lifted, thus leaving more time to focus on teaching and learning. Second, the academic focus of SAA was hoped by the school's SLT to increase student examination performance. SAA reflected the school's commitment to the pastoral care of its students being implicit in improving academic performance. This was also a major reorientation of the school's pastoral commitment, as previous to SAA the 'tutor' in a pastoral sense was paramount. The school did explore different tutoring models such as 'vertical tutoring' (where tutor groups consisted of students from more than a single year

group), but the model of contact remained via physical tutor groups, with all of the administration tasks carried out through the tutor group and managed by the tutor.

In contrast to the previous pastoral model SAA positioned the school's pastoral system within the curriculum. For example, as there was no designated tutor period, a student experiencing a pastoral need, and wanting a physical face-to-face meeting with their SAA, was met either at break times, after school, or during curriculum time. The removal of the teacher from the administration of pastoral duties was underpinned by an increased provision for pastoral support - in addition to SAA teachers, SWOs, LSTs and student support staff the school improved links with the local Police, Social Services and GPs.

There were two prominent technologies in SAA - e-portal for registering students' attendance, and Windows Live Hotmail (WLH) for communication between tutor and tutees as seen in Image 5.3.

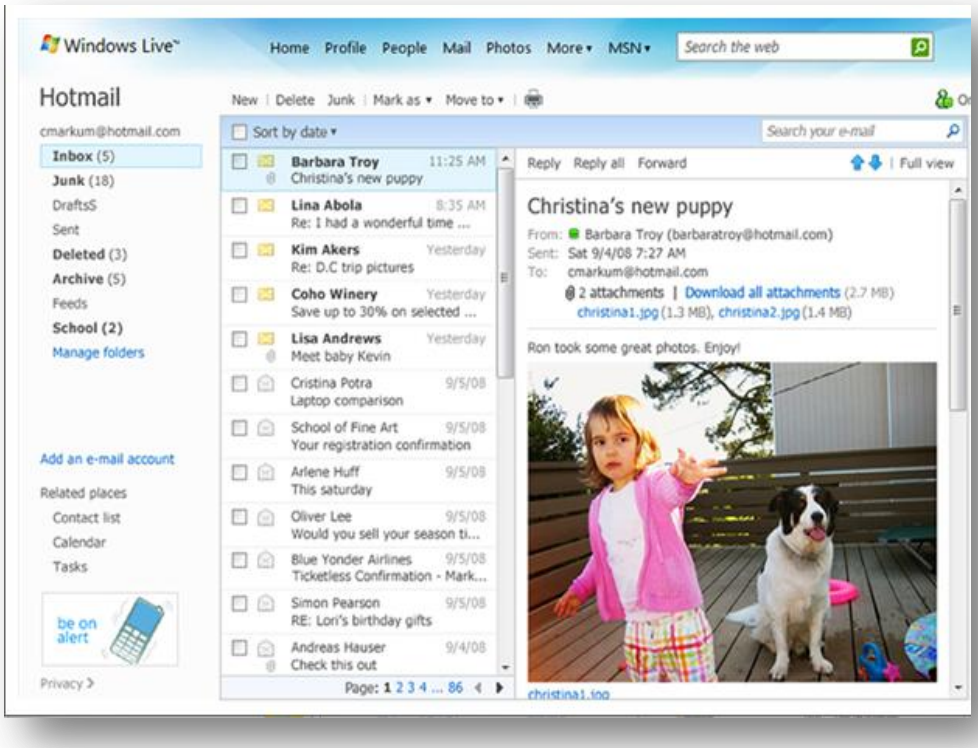

Image 5.3 WLH screen

Teachers completed the registration of attendance via the e-portal system on the Learning Gateway – e-portal mediated teachers' access to CMIS data regarding students' examination

and test scores, SEN information, their home address, telephone and email contacts, and data relating to behavior, attendance and punctuality. The e-portal system was managed by SERCO (I discussed SERCO in Chapter 4 with regard to CMIS), and was part of the company's Student Information Service (SIS) package called Facility e-portal. The protocol for entering attendance data on e-portal mirrored that of PMR I discussed earlier in this chapter. Teachers accessed their class data (called roll-call) via e-portal, which provided a DDL displaying a photograph of each student and a box into which the appropriate attendance code could be entered (there were 15 different codes relating to attendance cataloguing for example, unauthorised absence, off-site education or religious observance). Image 5.4 shows the e-portal menu page and image 5.5 the teaching groups and attendance data entry page.

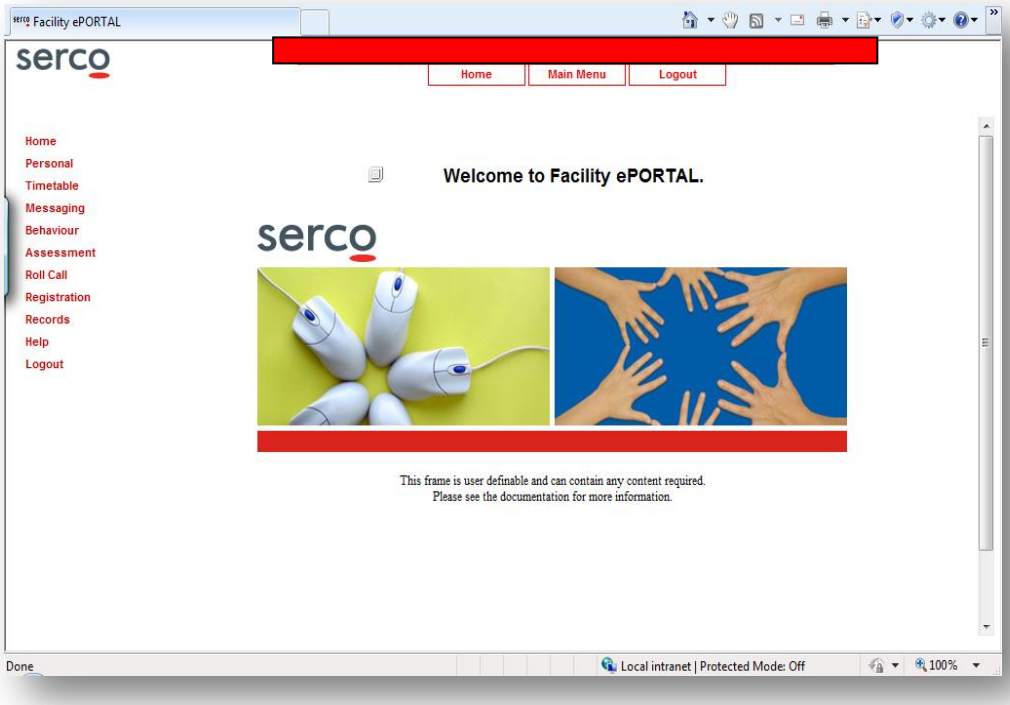

Image 5.4 e-portal menu page

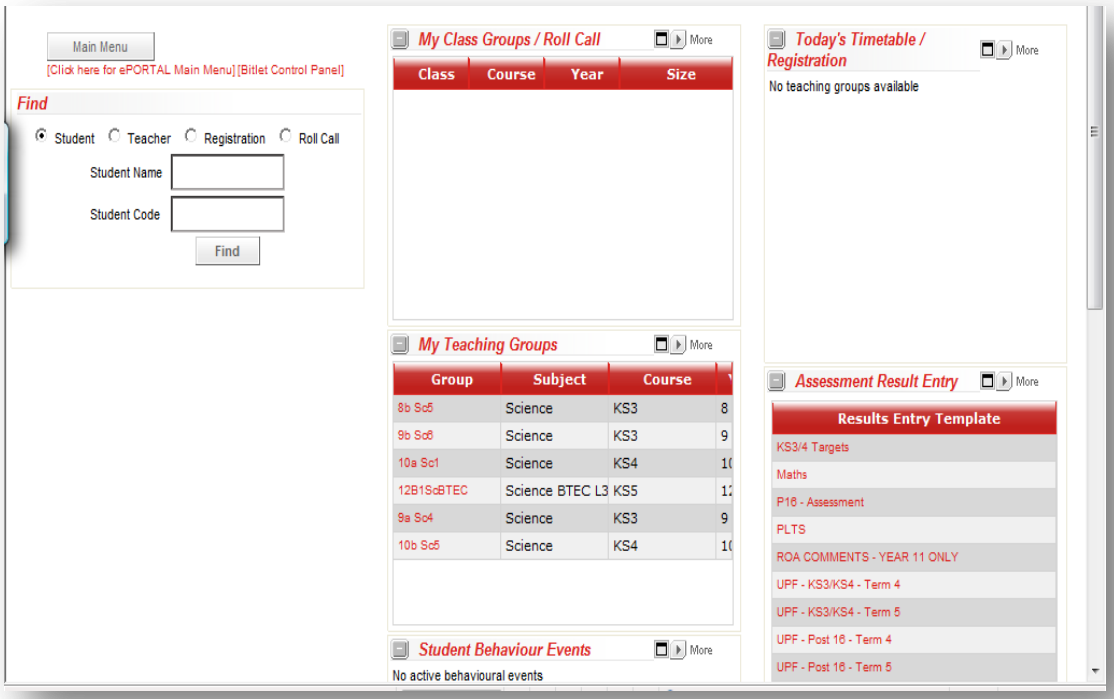

Image 5.5 e-portal attendance data entry page

As the SAA system removed the role of the tutor and tutor group meetings, the onus of entering statutory attendance data was instead on students' class teachers. SAA could only be viable in a school with a system such as e-portal where attendance registers were taken in curriculum as opposed to tutorial time. SAA also relied on WLH to be operational. WLH is a form of webmail system - setting WLH as the email system for students had a number of benefits. First, the system was free and supported by Microsoft and therefore required no additional NS staff for the system. Second, having a separate email system from the one used by staff (Microsoft Outlook) enabled the WLH message traffic to be monitored for cyber-bullying, or inappropriate contact with people from outside the school's intranet by using the WLH Sweep function. WLH has unlimited storage and shares many of the features used in other major webmail services. WLH does however have a number of unique features. ActiveView allows the user to directly interact with the contents of their emails. For example, photographic attachments can be previewed through the ActiveView function, and the user can view multimedia attachment, such as those from YouTube, within the WLH email. WLH also has a function called SmartScreen, which filters junk emails and has a virtual 'broom' to enable the easy cleanup of 'spam' (unsolicited junk emails) from the inbox.

WLH also integrates with Office Web Apps to mediate high quality access to Microsoft Office Word, Excel and PowerPoint documents. This was an important function as it mediated teachers sending and receiving students' work on WLH. WLH also has a Conversation Threading Application (CTA) which provides the automatic grouping of emails from a conversation into a conversation thread. This gives the user the opportunity to quickly browse through emails with the same conversation thread. Conversation threading is supported with the use of Quick Views in WLH, which groups emails together by document, multimedia or image attachments.

Central to SAA was its mediation of an increase in what the SLT called learning time. The use of technology to mediate a removal of the need for a physical world meeting of students and their tutor addressed a number of challenges for the school. First, not having to timetable rooming for tutor period resulted in a simplification of the timetabling process. Second, teachers and students did not have to move from their tutor room to arrive at the first lesson of the day – SAA mediated a reduction in movement around the school. As Estelle commented, SAA appeared to be the answer to a range of problems:

> *A.C – Could you tell me about learning time?*
>
> *Estelle – Well it's about removing 'dead time' from the school day so that there is the students have the maximum possible contact with learning experiences.*
>
> *A.C – And technology helps with this?*
>
> *Estelle – Without a doubt. If we didn't have e-portal then we couldn't have a system like SAA. Being able to take registration during curriculum time has had a fundamental impact…we don't have to have 1,000 plus kids all moving at the same time twenty minutes after we've had 1,000 plus students walk into the school.*
>
> *A.C – So leaning time and SAA is about cutting down on movement?*
>
> *Estelle – Yes but it's more than that. Learning time is about making it clear to the kids that the moment they walk into the school they should be ready to learn. When everyone knows that's what's happening then it really impacts. The kids know that they aren't going to wander in and chat with their mates…they're here to make the most of every minute.*
>
> (Estelle, HOF – Interview, HOF office, after school)

Like Estelle, David frequently used e-portal in his work and for a variety of tasks, for example, accessing the contact details for students' parents or guardians. Another teacher, Jenny,

discussed how having access to student identification photographs was extremely useful when 'covering' (taking a class for an otherwise absent colleague) a group of students with which they were not familiar. Jenny's comments were supported by my own observations of her taking such a class:

> *Jenny was covering a year 11 English class. When Jenny got to the room there were 12 students in the room – most were sitting on desks with their hats and coats on, which was against school dress code policy as hats and coats should be removed indoors, and were chatting with each other. Only 1 student looked up to acknowledge Jenny's arrival. Jenny introduced herself and distributed the tasks she had been given for the students to complete. Once she had done this, and with only 3 of the students following her instructions, Jenny opened her TPC and logged-on to e-portal. She clicked on the role-call tab and the information for the group she was covering was displayed. Jenny then clicked yes on the GUI which asked her if she wanted to 'view student photographs'. At this, next to each students information was a picture. As soon as Jenny had this information she started to refer to the students by their first names – bearing in mind that Jenny had never taught any of these students previously. The atmosphere in the classroom immediately changed; students removed hats and coats and became engaged in the task. Jenny was also able to use the student information pages to begin to establish rapport with individual students by talking about shared experiences. Jenny's ability to manage the class was mediated by the information she accessed via e-portal.*
>
> (Jenny, Media teacher – Observation, KS4 class room, afternoon)

The overwhelming majority of teachers I spoke to praised e-portal and positioned it as making their lives significantly easier. Unlike the PMR tab I discussed earlier, e-portal was resilient and resistant to glitches and crashing. However, e-portal was rendered inoperative by the school's intranet being disrupted. The consequences of e-portal being inaccessible were serious. If e-portal was 'down', no one in the school knew which students were, or were not, in the building. This had major implications for health and safety; in the event of a fire the e-portal registers were used to ascertain the whereabouts of the students. Christian recounted at least two occasions when a fire alarm was activated during a period when e-portal was inaccessible:

> *Christian – The fire alarm went off again yesterday and we all trooped out with the laptops and when we got out there* [into the playground] *none of us could get onto e-portal. It wasn't anyone's fault as it was just sod's law that the intranet crashed when we went out. But it's serious…if that was a real fire then no one would know who was supposed to be there. With the kids going straight to Period 1 it's not like the tutor can stand with their tutor group and check whose there and who isn't. The registration process is so technology based that if the technology fails we don't actually know where the kids are.*
>
> (Christian, English teacher – Field note, KS3 staff base, after school)

I observed Sandy using WLH to support the SAA system with WLH being quick, easy to use and reliable:

> *Sandy wanted to tell some of his SAA students that there was a change to what they should be doing on the last lesson on Friday. He simply opened WLH, signed in, and then sent an email directly to the students in his SAA group. The whole process took no more than a minute*.
>
> (Sandy, SAA – Observation, KS4 staff base, morning)

Teachers used WLH to contact individuals in their virtual tutor group, as well as the group as a whole. However, students did not appear to use WLH to email their SAA – Sandy said that he had not received any emails from his tutees. WLH seemed to have the primary function of acting as a 'message board' to advertise events and give out notices.

As with the lack of email communication between the SAA tutor and their tutees, there was also no evidence of an on-line community between students who shared an SAA. I did talk to a year 12 student, Kyle, and a year 13 student, Shannon, about WLH mediating the SAA system and they appeared frustrated by the SmartScreen function (and other firewalls) which blocked email content. These students were concerned that their email messages would not be private, and consequently they used their own personal communication devices such as SmartPhones to text and email each other:

> *Kyle – It's OK I suppose to get emails from your tutor telling us stuff. But I don't get involved in a conversation on it [WLH]. If I want to talk to my mates I email or text them on my iPhone. I don't need to use the school's system…and the teachers can see what we're saying anyway with the school system. I don't want that. I want my conversations to be private; I don't like the idea of teachers being able to snoop on me…so I just use my iPhone.*
>
> (Kyle, Year 12 student – Field note, KS5 classroom, morning)
>
> *Shannon – When I first got here I used the school's email system 'cause I didn't have a SmartPhone then. Now everyone has an iPhone so I use that. My tutor contacts me on WLH about stuff sometimes but that's it. I wouldn't use the school system.*
>
> (Shannon, Year 12 student - Field note, KS5 classroom, morning)

These students' concerns were supported by my own observations of the NS team. Even the small amount of email traffic generated by students on WLH was grouped together by the CTA function to provide threads of conversations. Emails were also grouped by attachments.

The SAA data set portrayed a system which was completely reliant on highly complex and interrelated meditational technologies, systems and rules. Data, which was part of the pastoral care commitment of the school, was mediated by e-portal; communication to students in the 'virtual' tutor groups was mediated by WLH. However, in both cases, the complexity of the SAA system indicated the importance of these tools in underpinning SAA. David was an advocate of many of the applications of e-portal, particularly the access it afforded teachers toward a range of different sets of data. As David told me, e-portal had become an extremely useful and powerful technology:

> *A.C – You're a fan of e-portal then?*
>
> *David – Yes…after a while it's easy to take e-portal for granted. I can remember paper registers though, and having to do attendance figures with a paper and pencil.*
>
> *A.C – So it cuts down on the amount of time you have to spend on registers and things?*
>
> *David – No! We have a lot more things to do now so it probably takes more time. With e-portal though it's worth the effort because the information we can get is really helpful.*
>
> (David – Interview, KS4 classroom, morning)

The wide range of functions on e-portal made it a tool which was the 'first stop' for David. For example, clicking on the 'my teaching groups' tab displayed a range of information regarding David's teaching groups. David was able to talk to students and parents about patterns emerging from the e-portal data not just over days, but weeks, months and years. For David, being able to access these patterns and to physically display them (for example in graphical form) was a particularly powerful e-portal application:

> *David – When we can say to a parent that their child has been absent every Tuesday morning for the last two terms then that's one thing. But showing a bar chart of attendance, and then linking that to the attendance for example of the kid's best mate who is also absent every Tuesday morning is really powerful.*
>
> (David – Field note, KS4 staff base, break)

David also highlighted the benefits of the e-portal application of having students' identification photographs accessible to teachers – see Image 5.6. This was echoed by Jess, who highlighted how her role as HOF was significantly easier simply by being able to link faces to names:

A.C – How does having the pictures help you?

Jess - As a HOF I have to be able to sort out situations as a travel from sight to sight. Often I will just walk into the door of one building and then I'm confronted with a teacher and a student. There are almost 2,000 kids in the school so there's no way I can know all their names.

A.C – So you use e-portal?

Jess – Yes, I'll find a room and start talking to the student about the situation. I will be logging-in to e-portal at the same time, I can then access the teaching group that I think the student is from and then I can see the photos. As soon as I know the name I start using it. I can also then access all the data we have on that kid – their attendance, test scores and behaviour events…it's all there.

(Jess, HOF – Interview, HOF office, after school)

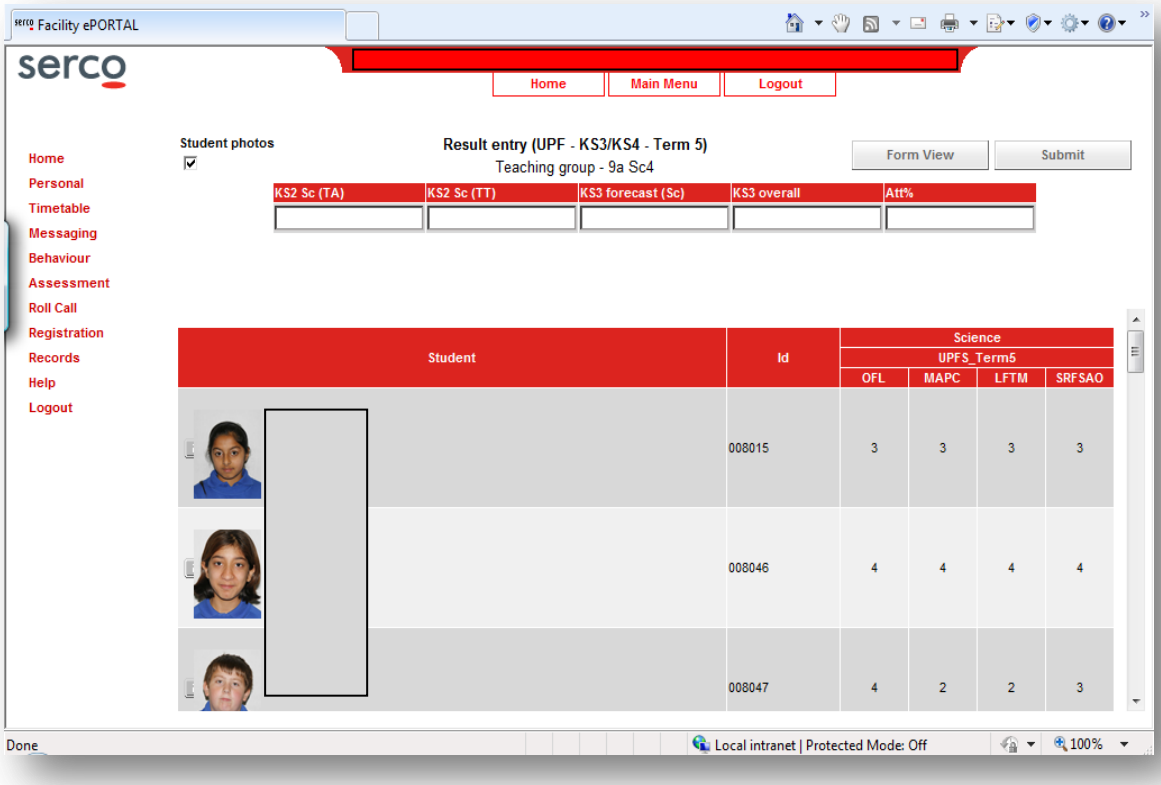

Image 5.6 e-portal student photographs

Jess was clear that e-portal mediated a system which she could use to access so as to use the names of students she did not know when talking to them – for Jess, this had beneficial effects particularly with regard to the ability for teachers to begin to build relationships with students who they did not know. Jess' comments were echoed by David who told me:

David - Just saying to the kids "I'm going on e-portal" has a real effect. The kids know that you can I.D [identify] *them, and that you can get a contact number easily…. I think it's had a really positive effect.*

A.C – So you're more likely to use first names for example?

David – I suppose I am more likely…I think using the kid's first names is so important and e-portal helps me to do it. I just look on e-portal and I can put a face to a name.

(David – Interview, KS4 classroom, morning)

Despite David acknowledging the benefits of e-portal, there were a number of challenges with using the system. For example, the e-portal front page was described by Chris as "anything but user friendly":

Chris – e-portal is so powerful and I can't even image trying to do my job without now. But as e-portal has evolved it's definitely become more complex to use – when I talk to new colleagues they say that it's not particularly intuitive. I don't think that's fair really. I think e-portal is really well designed…the difficulty comes with trying to understand the complexities of the school's systems. As the school has become more complex e-portal just mirrors that.

(Chris, Science teacher - Field note, KS3 Science lab, Lunchtime)

I also spoke to Sally who was newly appointed to the school. She said that although she was given training, this was not detailed enough for her to feel confident as how to use e-portal – Sally's worry was that she was expected to use it comprehensively from her first day at the school:

Sally – e-portal is like the cornerstone of the whole school. When you first start you do get some training, but it's like everything else on a computer you need to play with it, get used to how it works. With all the things we do on the first induction week it's so hard to find time…by the time the first day with the kid's came along I wasn't confident with e-portal at all. I made lots of mistakes. I had to really rely on my colleagues to help me.

(Sally, Languages teacher – Field note, KS4 staff base, break)

David also described, how as with many of the systems at Brampton, e-portal had become increasingly complex:

David - The results entry tab has become so complicated I get lost using it. Because of CMIS, all the data is linked together which is great, but there are two different entry tabs for every class that I teach. There's the Academic Assessment Entry (AAE) tab, and the Skills for Learning (SfL) tab [SfL is a grade between 1-7 which ranks students' time keeping, organisation, ability to work with others, relationships with peers and teachers]*. So many times I go to enter an AAE grade and open the SfL tab by mistake.*

(David – Field note, KS3 staff base, before school)

A number of David's colleagues indicated that e-portal was complex to use, and it took a relatively long time to understand its functionality. As Tony commented, this was no different from using a new piece of technology when moving to a different organisation. However, what did emerge from Tony's comments was that even those teachers who had been using e-portal for many years were finding it increasingly difficult to use.

> *A.C – What's your opinion then of e-portal, how has it developed over the last few years?*
>
> *Tony – It has become much more powerful and better at helping us. There is a lot more data available to us, but of course that's not always a good thing!*
>
> *A.C – In what way?*
>
> *Tony – Because of all the interlinked data we have e-portal has to reflect that. So what happens is that the system becomes more complex to use and more fragile. I think that e-portal is brilliant. But like all systems you've got to be aware that it can go wrong, it can crash, the data can be wrong. I think that when new members of staff come in e-portal is positioned as this panacea for all their problems.*
>
> *A.C – How?*
>
> *Tony – Well entering a behaviour event onto e-portal might make you feel better at the time. And it's the policy. But something will only happen if a teacher, YLL or HOF or SLT looks at the data and does something about it. I think some people think that it's e-portal that'll talk to the kids!*
>
> (Tony, Mathematics teacher – Interview, KS3 Class room, lunch time)

Like Tony, David claimed that the e-portal system had reached a crucial point in its trajectory:

> *David - It's* [e-portal] *sort of at a tipping point, where using it is becoming so complex and time consuming that it's close to outweighing how useful it is. If I ask myself "do you want to get rid of e-portal" the answer would be no. But as the demands on teachers have increased, and particularly the amount of data we have to produce, e-portal has had to get bigger and more complex to be able to handle it all.*
>
> (David – Field note, KS4 classroom, break)

David was also concerned about e-portal suffering from data entry issues. He was not criticising teachers *per se* for entering inaccurate data; however David was adamant that some of the e-portal data was not reliable. David linked technology such as e-portal with what he considered to be the increased levels of stress teachers experienced. He highlighted a connection between the need for teachers to evidence their practice through data, e-portal and CMIS as the tools which mediated the collation of data, and the mistakes being made in data entry:

David -The increased needs of the kids we have here, and the prescriptive lessons plans, mean that anything like putting test data into e-portal has to be done outside of lesson time. Free periods are already used up with marking and lesson planning so using e-portal has to be done at a different time.

A.C – After school?

David - You can access e-portal on the Internet so teachers are just working at home more. There doesn't seem to be anyone sitting down in the staff rooms and having a chat, everyone is working on their tablet all of the time.

(David – Interview, KS3 corridor, lunch)

David was also concerned with how much the school and teachers relied on e-portal. Due to the reliance of e-portal on the school's intranet (as it was accessed through the Learning Gateway), a loss of intranet connection rendered e-portal inaccessible. This had major implications for the whole school, as e-portal was the only record of attendance data. As David told me:

David - If e-portal goes down no one knows who's in the school. This is a major problem because we've got all these vocational courses where kids are off site. P.E is off site, without e-portal we haven't a clue what kids are where.

(David – Field note, KS4 cafeteria, break duty)

Craig echoed David's comments – he suggested that the school seemed to 'fall apart' when e-portal crashed. He went on to suggest that there was a worrying over reliance on computer mediated systems at the school:

Craig - As the school's become more about technology, with all the computers we've got, the more technology reliant we are. That's OK because the entire world is like that. But if you think how big the school is, 2000 kids, 200 teachers, and even more support staff, and then think about the IT support in a company of that size I bet it's much bigger than here. We've got 4 full-time and 2 part-time NS staff for over 2000 computers. And that's not even counting the servers and wi-fi.

(Craig. SWO – Field note, KS3 staff base, break)

This notion of over reliance was echoed by David's own concerns:

David - e-portal has become the first port of call for just about everything teachers do. It's so powerful, when it's down people are just lost, they don't know what to do.

(David – Field note, KS3 staff base, lunch)

David's concern was not just focussed toward e-portal as a tool related to the entering and storage of data. His view was that e-portal had become such a part of teachers' activities that

it had begun to re-orientate some of the social norms in the school. For example, David claimed that teachers used e-portal as their 'first port of call' rather than talking to fellow teachers. The result of this was that teachers were not having the conversations regarding students, which David claimed used to regularly occur:

> *David - Teachers are using e-portal more than talking to each other. That's fine in lots of ways but e-portal has become such a powerful tool that teachers are relying on data rather than the context of the data.*
>
> *A.C - So the context is all about 'hard' numbers rather than what the back story is?*
>
> *David - Some teachers aren't talking to their colleagues because they don't think they have to because e-portal data tells a story. It doesn't tell the whole story though and lots of context is missed.*
>
> *A.C – Such as…*
>
> *David – Well, conversations in the staff room, especially with the newer teachers…they're all about what is so and so's test scores, or their predicted grades. That's the first thing that's discussed…and that conversation's all about the computer and the data on it.*
>
> *A.C – Isn't it two professionals having an informed discussion?*
>
> *David – Of course! I'm not saying don't use the computers, don't use e-portal, don't use all the data we've got, that'd be crazy. What I'm saying is this stuff shouldn't always be the first thing that's talked about. If a kid is causing some challenges, then for me, the first thing we should be talking about is what's his story, why is he finding it hard - then you look at how that's affecting their academic* stuff.
>
> (David – Interview, KS4 staff base, non-contact)

David suggested that WLH should have a central role in SAA. However, I was interested why WLH had been set up as the default means of communication between staff and students. I spoke to Keisha the head of the NS department:

> *A.C - Why WLH then?*
>
> *Keisha – Well it's an evolution from MSN Hotmail which used to be the default email protocol for students…but that was set up before I joined the school.*
>
> *A.C – Was there any particular reason for MSN?*
>
> *Keisha – MSN was a good system. It was something that Microsoft provided and maintained.*
>
> *A.C – So in your view MSN was good?*
>
> *Kesiha – Yes...but WLH is the next stage, it's better again.*
>
> *A.C – With some of its applications?*

Kesiha – Yes. But also because it's also supported by Microsoft I don't have any pressure for maintaining it. WLH is a zero cost tool for us.. But its security features, particularly the ability to access attachments without opening the email, and the conversation thread tool are a big step forward.

A.C – These things help you?

Keisha – Yes. I'm more confident with our ability to keep the kids safe with WLH.

(Keisha, Networks Services Manager – Interview, NS Office, lunch)

David however was less enthusiastic - he claimed there was a disconnection between the undoubted power and functionality of WLH and the amount of email traffic on it:

A.C – The NS team think that WLH is a step forward…and that it helps them.

David – Maybe…there's a big problem with the email system because the kids don't use it.

A.C – So some of the features that are designed to keep the students safe are the ones that are turning them off from using it?

David – I think so. I'm not a NS expert. But just in my SLT role there's less evidence from emails being sent by kids on the school system. I don't think that's just because of what we've got here. The whole iPhone thing means that they don't need to use our system. They just text and email each other on their phones.

A.C – So it's just a case of the kids taking on new technology?

David – Yes it is, the problem though is that the school has set up this system where tutorial support is interwoven with internal emailing. And the kids just don't need to use it anymore.

(David – Interview, KS3 staff base, before school)

David's concerns were confirmed by Aisha who I interviewed regarding her experiences of WLH as a SAA tutor. When I asked Aisha how many emails she had received from her tutees she replied two. Indeed, Aisha had physically gone and met her SAA group – despite this she had only received two emails:

Aisha - I felt really bad that I had this group of kids that I was the tutor for and I'd never even met some of them. I kept emailing to set up times just to meet but it was so hard. So I just went around the school on my free periods and went into their classes and introduced myself. There're still some that I haven't been able to talk to yet though.

(Aisha, P.E teacher – Field note, KS4 corridor, after school)

Clive claimed that he had tried to use WLH to contact his tutees but that he was more successful with physically going to his students' classes and talking to them face-to-face:

> *Clive – I don't even bother with the email. If I need to talk to some of my SAA group I wait until I'm on the site they're at and go into a class to speak to them. It's hard though because I can only do that when I'm not teaching. Some things just slide…*
>
> (Clive, Science teacher – Field note, KS4 science lab, afternoon)

For David there was a change in WLH in the school post-SAA:

> *David - Before SAA, if kids didn't use WLH it didn't matter as it was primarily a communication tool between students. After the introduction of SAA, WLH became the main communication tool between teachers and their SAA tutees. If the kid's don't use WLH we can't talk to them.*
>
> (David – Field note, KS3 staff base, break)

David suggested that the challenge for WLH was because originally the SAA group consisted of students teachers taught, and would therefore meet in curriculum time. Because SAA groups consisted of at least a small proportion of students the teacher did not teach at all, there was a breakdown in opportunities for communication:

> *David was trying to contact a member of a Year 9 SAA group. He had gone to a staff base and had found the member of staff, Cindy, who was the SAA for the student. David asked Cindy if she knew where the student was; he wasn't in the class which e-portal indicated was where he should be. Cindy was unable to answer David's question. She said that she had been trying to contact the student by email, and had even attempted to speak to him face-to-face, but had been unable to find him. Cindy had informed the student's SWO and YLL but nonetheless she was concerned about his non-attendance. The student was not in any of the classes Cindy taught, and she had never taught the student previously…they had never met.*
>
> (David and Cindy, SAA – Observation, KS4 staff base, morning)

The problem with this lack of face-to-face contact between tutor and tutee was compounded by WLH not being used by students. Like Cindy, David was concerned:

> *David - Pastoral care is important. I'm really worried about SAA because the technology hasn't done what it was supposed to. The whole idea of SAA was that students' still got pastoral support but it was within a curriculum context. Because the kid's don't like WLH some of them aren't getting any support at all.*
>
> (David – Field note, KS4 staff base, lunch)

Interviewing David and other teachers suggested there were two recurring theories relating to why students did not appear to engage in using WLH. First, the WLH SmartScreen function

(and other firewalls), which blocked email content, frustrated students when using WLH. This theory was supported by a year 12 student I spoke to, Courtney, regarding WLH firewalls:

> *Courtney – Teachers collect all the emails. I don't like being checked up on…I know how you can thread all the emails together. And you can check up on photos and videos and stuff without even opening the email. Why would I use the school system for that when I can use my iPhone and it can't be checked?*
>
> (Courtney, Year 12 – Field note, KS5 science lab, morning)

Courtney's concerns regarding being 'checked up on' by the school (interestingly she thought it was teachers as opposed to NS staff who did the checking) resonated with teachers' worries about unsolicited use of WLH. For example, David had concerns regarding students breaching firewalls, and that the ActiveView function gave the opportunity for students to access multimedia attachments which might be inappropriate:

> *David – It's interesting times. If a student's looking at pornography, or happy slapping, or texting their 21 year old boyfriend during school on their Smartphone, where do we stand…at least before, if they were using the school's system we could police it.*
>
> *A.C – How?*
>
> *David - One of the best ways is to take a screen shot of what they were accessing and sending it to the parents. That worked well. Also, the NS team could save all the emails on the server. We could access emails that the kids had sent over a long time period. If the kids are using their Smartphone what are we supposed to do? The kids can watch videos in class and we don't even know…the phones are so small it's impossible.*
>
> (David – Interview, KS3 staff base, after school)

Whilst David acknowledged the school's duty of care toward its students and the resulting need for Internet security, he also sympathised with the students who perhaps understandably chose not to use an email system they thought was not confidential. David suggested there was another disappointing aspect of the lack of students' use of WLH:

> *David - There's no evidence of an on-line SAA community. The kid's aren't using WLH to talk to us and they aren't using it to talk to each other.*
>
> (David – Field note, KS4 staff base, break)

The concern David had for the lack of communication in WLH reflected a wider anxiety. Morgan discussed the difficult home lives from which some of the school's students came, and he was adamant that the school partially provided these students with some stability, safety and

somewhere where they could be listened to – for Morgan, the school's pastoral care system was part of this stability:

> *Morgan – Communication with technology is different from communication without it. Some of the kids who come here don't get talked to all day…they get shouted at, by the bus driver, shopkeeper, teacher, but no one talks to them. We've got a responsibility to the kids here. Part of that responsibility is communicating with them, face-to-face communication. I'm worried that something might happen to a kid and no one will know. The whole pastoral system here is based on the computer; it should be based on the kids.*
>
> (Morgan, SWO – Interview, SWO Office, lunch)

David talked about pastoral care being more than just a ECM commitment, and that there was, within the school's duty of care toward its students, a moral and ethical responsibility. David's comments resonate with those of authors such as Rose who position schools as a 'moral technology' (1999, p. 227), and Marland and Rogers, who suggest that schools have an objective toward developing the 'moral consciousness' (1997, p. 19) of students through the tutor-tutee relationship. David positioned SAA and particularly WLH in SAA, as having a negative impact on this moral responsibility.

David claimed that his views regarding the implementation of SAA 'undermining' the schools pastoral care commitments put him in a difficult position. SAA was a symbol of technology at Brampton, and part of the image depicting the school as innovative. However, David insisted that the technology which mediated SAA also redefined the pastoral care model at the school:

> *A.C. – How do you think technology has changed pastoral care at the school?*
>
> *David - SAA has changed the pastoral system here from being based on groups, and individual relationships in those groups, to a system where kids are supposed to be in charge of their own emotional wellbeing.*
>
> *A.C – How's that happened?*
>
> *David – Technology has allowed us to get rid of the 'registration' period at the start of the day. At SLT the discussion was about increasing learning time. But the whole registration period was more than just that…it was about teachers and students starting the school day together. It was about preparing the kids for the day.*
>
> *A.C – And SAA has made that obsolete?*
>
> *David – The technology has made it obsolete. I don't think getting rid of old fashioned 'tutor time' is a good thing. In part, implementing SAA was in response to OfSTED commenting about dead learning time. But the tutor time was all about relationships, about teachers talking to kids in a different context.*

A.C – And those conversations have gone…

David – Not gone…but basing SAA as a distance, and technology reliant, system has reduced them. And I think the school's worse of for it.

(David – Interview, KS4 staff base, after school)

David's remarks had a resonance with what Rose calls 'self-government' (1999, p. 264). In this model, self-government reduces the responsibility of the state for the health, security and welfare of its citizens, instead putting the onus on citizens themselves to 'do their bit'. Like David, Colin was concerned that the responsibility for pastoral care in SAA had changed from that of the school to the students. As Colin put it, SAA asked "what are after all children" to have the emotional maturity to be able to actualise their own pastoral care:

Colin - Frankly it's amazing so many of our kids get here at all. Their lives' are so chaotic that getting to school is a real challenge. But it's difficult for them. It's difficult enough just getting here. Now we expect them to be able to know when they need some help. With the old tutor system, at least they would meet an adult in a non-learning setting once a day. Now all they meet are 'teachers' who are telling them to do something. These are kids and they need to be supported in their pastoral care.

(Colin, SWO – Field note, SWO Office, lunch)

Because SAA was a 'virtual' system, and because the pragmatics of its use resulted in teachers potentially never meeting some of their tutees, there was a concern amongst some teachers that pastoral care issues would not be recognised. David was also concerned that SAA was part of a discourse of teachers' professionalism. David claimed that change did not worry him and that he was not 'stuck in his ways'. However, he identified a culture of change for change's sake. Whilst David was quick to accept that the previous model of pastoral care was not perfect, like Colin, he insisted that it was preferable to SAA particularly with regard to the technologically mediated aspects of SAA:

David - I'm really concerned that the technologies we have here have taken away the opportunity for kids to have a face-to-face conversation with an adult who's not trying to 'teach' them something.

(David - Field note, KS4 staff base, break)

For David, SAA was also a symptom of restricted professional responsibilities and public accountability, and that, whilst this was not necessarily a bad thing, schools needed to be careful:

A.C – Where do you stand on ECM?

David - After the Climbié case [Victoria Climbié] *something had to be done and that's been ECM. But haven't we just thrown out an extra level of protection? I'm not saying for sure that a good tutor system could've helped Climbié, but I'm confident that a good tutor would've spotted things. I mean a good tutor spots that a kid isn't in school.*

A.C. – So technology has mediated a system that in your view has resulted in a reduced, rather than enhanced, pastoral care system?

David – Yes, because it's not just about communication…in the business world, and with adults, there's a whole layer of expectations and social norms that might not be there in a school with children. In business there doesn't seem to be a down side with technology and communication. In school we can't abdicate the importance of face-to-face communication between a child and an adult.

A.C - Is it a case of the model of technologically enhanced communication in business doesn't necessarily map across to a school?

David – I think so…in business you have meetings with your client once a month, once a week, and that's enough because email, or the traditional phone call, covers what needs to be said. With students that model doesn't cut it. We can't rely on technological communication totally.

(David – Interview, SLT Office, break)

David claimed that SAA had changed what pastoral care was at the school. He also claimed that the reliance on technology in SAA had mediated changes in the importance of teachers' personal input and judgements with regard to students' pastoral care - comments which reflect what Ball (2001, p. 222) calls 'subordination', where teachers' professional judgement is either ignored, or devalued, because of the reorientation of essential parts of their role.

SAA analysis: stage 1

My analysis of David's SAA data set revealed concepts describing what he considered to be the role of technology in mediating the model of pastoral care in the school. The two technologies most prominent in David's data were e-portal and WLH. My analysis revealed that for David these tools had not simply mediated an incumbent model of pastoral care, but had totally redefined the model. The position of e-portal in mediating the SAA model of the virtual tutor had in David's view become fundamental - the removal of e-portal from the school would render SAA impossible to manage. However, e-portal was more than just a tool for mediating the school's pastoral care. David described e-portal as a 'powerful tool' and that in many instances (not just connected to SAA) it was the 'first stop'.

David was quick to portray e-portal as a technology which mediated significant applications which supported him in his work. However, David also indicated that e-portal was becoming increasingly more complex to use, and that the demands of SAA as part of CMIS had amplified the amount of information he had to manipulate. The frequent redesigning of the e-portal front page added to the complexity David experienced when using the system. There were also concerns raised regarding the accuracy of the data entered into e-portal. David accepted that the integrity of e-portal data was vital - he also acknowledged that in sometimes very stressful conditions teachers made mistakes with data entry resulting in, for example, students inaccurately marked present when actually absent.

David was concerned that a lack of a face-to-face meeting between tutor and tutee, and the SAA system being mediating analysis of data from multiple sources (i.e. class teachers, SAA, LST, SWO, etc.) could lead to the school having no accurate record of attendance. David's worry was that even though possibly 8 different teachers might teach a student in one day, no single teacher - with the responsibility of tutor - might meet this child face-to-face during that day. SAA relied on e-portal data to alert what might be an inter-agency response to a student's needs. However, in David's view, if there was a mistake with a data entry there was potentially no teacher available to physically check who was, and was not, present.

The concept of inaccurate data also emerged when David discussed his concerns regarding the over reliance on technology such as e-portal at the school. How e-portal, not just mediated SAA but almost all of David's activities, brought into focus the position of technological mediation at the school. As David commented, the school "fell apart" if e-portal crashed. However, technological mediation at the school was not just in terms of how teachers carried out their tasks, but what these tasks were. For example, e-portal mediated the removal of dedicated tutor periods. However, in removing this time students lost the opportunity for 'thinking time' between arriving at school and their first lesson. David raised the concern that a significant number of students at the school came from difficult and challenging home lives. However, the technology in SAA mediated a model, where from the first moment these students were in school, they were engaged in 'learning time' within a curriculum setting. This was a part of the SAA system, where 'dead' tutor time was replaced with constructive learning

time. What David claimed this model missed, was that the school's students actually benefited from such time, and as such was not dead time. David proposed that e-portal had mediated a removal of time in the morning where students could prepare themselves for the day to come, talk to friends in an informal atmosphere and, most importantly, in terms of pastoral care, have at least the opportunity to talk face-to-face to an adult or a friend about any issues they might be facing.

David suggested that removing dedicated pastoral time and replacing it with curriculum time impacted on the moral responsibilities of the school. Schools are infused with 'moral actions' (Jeffery & Woods 1998, p. 131) - actions which can be impacted on by changes in working practices, and which are central to teachers understanding of their professional identity. David claimed the effects of e-portal mediation were particularly prevalent with regard to the moral actions intrinsic in pastoral care - the removal of tutor period reduced students' opportunities to talk to teachers or peers outside of the structures of a curriculum lesson. In David's view there were major implications of locating pastoral care completely within curriculum time. David talked of the pressure to complete modules of work, which left little or no time to support students pastorally. The importance of e-portal represented a technology mediated culture where David felt his experience, beliefs and strategies were subordinated by the demands of highly regulated and data driven systems. David's position was that technology such as e-portal appeared to mediate a reduction in teachers' expertise and professional opinion to the periphery of pastoral care.

As with e-portal, WLH had a role in mediating the SAA model. However, the difference between the two technologies was that for David e-portal was primary not just to SAA, but to many of the activities in which he participated. WLH however, although being a central part of SAA in terms of its position in the system, suffered from the underuse by the students which itself undermined the entire SAA system. David had theories about why students did not engage with WLH, with the prominent suggestion being the students' dislike of being 'checked up on'. This raised a difficult question for the school. Because of the school's commitment toward e-safety, there had to be security firewalls in place for a student email system. However, the students chose not to use such a communication system which had high levels of

security and which rendered their email traffic as open for inspection. This was compounded by students' frequent use of Smartphone and other devices with which to communicate with each other. Consequently, not only did the students not want to use WLH, they did not need to.

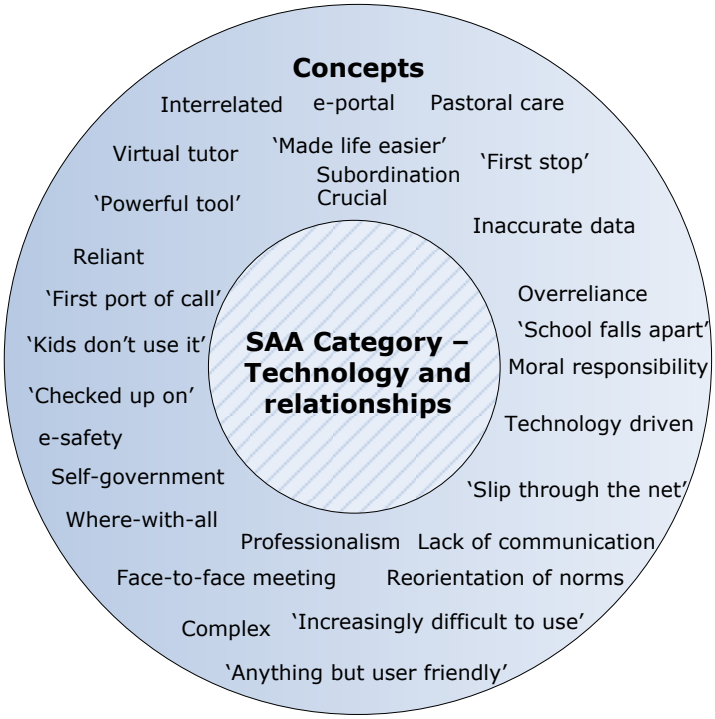

Figure 5.3 Micro-level analysis of SAA data

David's data suggested that removing pastoral care from the 'physical world' and placing it in the virtual world appeared to locate the responsibility for students' pastoral care to a greater extent with the students themselves. The assumption in this model of self-government was that students (ranging in ages from 11 to 17) were able to actualise their own pastoral care. David insisted that the disconnection between the students choosing not to access WLH, and the potential lack of pastoral support in SAA, manifested in students' needs not being met. In Figure 5.3, I outline the micro-concepts which emerged from David's data. These focussed on how technology had mediated redefined relationships at the school – particularly those between the tutor and tutee. I have established the SAA concepts within a category of 'technology and relationships'. I have highlighted technological mediation of the pastoral care relationships between students and teachers. The SAA system was implemented to both mediate the school's ECM commitment, but also to locate pastoral care within a context of the curriculum and academic attainment.

David indicated that pastoral care was just that, the school's responsibility for students' emotional and physical wellbeing. However, SAA whilst still making a commitment to pastoral care was explicitly positioned as linking such care with academic attainment. David commented that making such a link was at odds with his own pastoral framework - and also in tension with the importance of having a distinction between a school's tutorial programme and its academic programme. This is not to say that David saw the pastoral care model of the physical tutor group as an easy option for students or themselves – David maintained that the tutor makes demands of their tutees. The tutor is far more than someone who merely takes the register, the good tutor 'makes demands, enables growth, stimulates imagination, encourages self-esteem, develops judgement, creates a sense of coherence and provides security' (Marland & Rogers, 1997, p. 3). What emerged from David's SAA data was that for him, pastoral care 'physical world' relationships between tutor and tutee had become challenged by the SAA system and the technology which mediated it.

As can be seen in Table 5.2 there were resonances between the concepts and category which emerged from David's data, and that generated by other informants. For Kyle, Shannon and Morgan, SAA mediated changes in the relationship between tutors and tutees – for these teachers the positioning of technology as central to the school's pastoral care model mediated a re-orientation of the relationships between staff and students. This was particularly the case where technology mediated the removal of 'tutor time' and in doing so located relationships as those between teacher and student, rather than teacher and tutee. The concept of learning time was explored by Estelle who was clear that although technology mediated increases in learning time by reducing tutorial sessions, this also reduced the time for developing pastoral relationships. Morgan was particularly concerned that moving pastoral communication to being mediated by computer technology redefined this communication from informal and close to formal and distant. Having said that, my observation of Jenny's use of e-portal reflected how technology mediated positive relationships between teachers and students – Jenny's use of e-portal to mediate her using the names of pupils she did not know.

SAA Category	Technology and Relationships
Concepts	**Analysis**
Relationships	The positioning of technology as central to the school's pastoral care model re-orientated the relationships between staff and students – technology mediating the removal of 'tutor time' located relationships as those of teacher/student, rather than teacher/tutee.
Communication	Moving pastoral communication to being mediated by computer technology has redefined this communication from informal and close to formal and distant.
Pastoral care	The relationships between tutor and tutee in SAA has shifted the pastoral are model at the school. Technology has increased learning time through the removal of tutor periods, in doing so pastoral care has itself been shifted form the physical to the electronic.
Technological choice	Relationships located in technology are mediated by the technologies of choice. The increasing access to technologies such as SmartPhones by pupils, has mediated an evolving culture of communication.
Surveillance	The responsibility of the school toward its pupils has resulted in technologies which increase surveillance of staff and pupils and which affect the relationships between these groups.
Learning time	Technology increases learning time by reducing tutorial sessions, but reduces the time for developing pastoral relationships.
e-safety	ECM accountability, and e-safety, impacted on pastoral relationships. Technology mediates access to content that is inappropriate for children. The school's responsibility to employ firewalls to prevent this increases surveillance – in doing so, students reject the school systems and use their own mobile technologies. This reduces the schools ability to police content.

Table 5.2 Macro-level analysis of SAA data

What also emerged from the data was the concept of technological choice. For teachers such as Christian, Sandy and Jess, the relationships located within the school's technological environment became increasingly mediated by technologies of choice. For example, students' access to technologies such as SmartPhones mediated an evolving culture of communication where i-phones and BlackBerrys were students' communication technology of choice; the school's intranet was not. This has obvious implications for a pastoral system which relied on its members using a specific technology to mediate communication (in the case of SAA, WLH). For Kyle and Shannon the responsibility of the school toward its pupils resulted in technologies which mediated surveillance of pupils, and staff, and which affected the relationships between these groups. These comments resonated with those of Courtney, who, while acknowledging the school's responsibilities regarding e-safety (the use of firewalls for example) also indicated that it just this level of security prevented him from using technology the way he wished. As a result, e-safety, impacted on pastoral relationships - students rejected the school's pastoral

communication system and used their own mobile technologies which reduced the school's ability to police the content being accessed.

SAA analysis: stage 2

In the SAA activity the prominent mediating tools were e-portal and WLH. The subject was David Sharma, and the object was to develop a virtual tutor group system which sustained the school's commitment to ECM. The outcome of the activity was to support students pastorally with a system which identified their needs, whilst ultimately repositioning pastoral care within the curriculum and, in doing so, increasing examination attainment. The SAA rules related to the school's pastoral care commitments. In UK Secondary schools, the advent of ECM resulted in the rules which structure pastoral care changing from being relatively comprehensive to becoming more diverse:

> Certain things are clear: there is a much greater dependence on paraprofessionals to carry out tasks that were previously the preserve of teachers (covering lessons, in class support roles, mentoring and disciplinary roles); there is a much greater emphasis on inter-agency working particularly associated with early years and primary schooling; the creation of new institutions that bring together a range of services under one roof (extended schools with crèches, nurseries even pharmacies); there are workers in schools who may be subject to codes of practice and expectations that differ from those of the school; there are workers in schools who are subject to more than one set of rules or code of practice; there are workers who come into school from very different professional cultures, with different professional identities, who speak a different language and who bring with them different notions of care and caring. (Calvert, 2009, p. 274)

The SAA rules reflected this change in pastoral care. The increase in paraprofessionals can be seen in the SAA rules which augmented reliance on social workers, the police and health care professionals. The advent of ECM outlined a 'joined up' approach to children's pastoral care which relied on interconnected networks. For example, with ECM came technologies such as the ContactPoint database (now disabled by the UK Coalition Government). The ECM multi-agency approach to pastoral care was reflected in the rules which supported SAA and linked SAA with the wider school organisation.

SAA relied on David complying with the e-portal completion window for period 1 registers. As there was no dedicated tutor period at the start of the school day, the registration data used for the school's attendance figures was generated from the data David entered on to e-portal

after 30 minutes of period 1. Any student arriving after the e-portal window David marked late and issued with a late detention. The late code he entered into e-portal was then medaited via CMIS for access across all of the school's databases as part of the SAA inter-agency approach. The SAA rules also stipulated that each tutee should have had at least 1x50 minute tutor period per term.

The rules relating to WLH were defined by the Safeguarding Children Online (BECTA, 2009b) document, and the Byron Report, Safer Children in a Digital World (Byron, 2008). The specific firewall applications, which came as part of the evolution of WLH from MSN Hotmail, mediated SAA in relation to the challenges of 'e-safety' outlined in the BECTA and Byron documents. Students' WLH emails were scanned by the NS team through an application which highlighted keywords possibly indicating inappropriate use of the system. As with text, attachment to students' emails was also checked via the WLH ActiveView application. Students (like staff) had to sign the school's email usage policy, and inappropriate use of WLH could result in a student's exclusion from the school.

The SAA community included students, teachers, SWOs, LSTs, LSAs, YLL, SLT and inter-disciplinary agencies such as Police, Social Services and health care professionals. The division of labour was primarily with the SAA tutor and the school's pastoral care team such as SWOs. However, if an intervention was made then ECM required an inter-disciplinary approach and any of the interested parties then became part of the activity's community as well as included in the division of labour.

SAA Discussion

David saw technology such as TPC, the Learning Gateway, e-portal and WLH as the central tools mediating the 'virtual' model of SAA pastoral care at the school. The ECM interdisciplinary approach underpinning SAA required a technology reliant system with David's TPC fundamental in mediating the system. Part of the demands on SAA was that the school was 'split' site and David would be frequently travelling between locations. He might have duties on both of the school's sites on one day and would teach in a variety of different rooms within those sites. The Learning Gateway was configured so that David did not need to reboot his TPC

when moving between sites. This was a vital part of the Learning Gateway and e-portal functionality, as David did not necessarily have time between teaching periods to keep rebooting his machine. Consequently, the TPC afforded David constant access to e-portal and the Learning Gateway without him having to lose connection because of travelling between sites.

David did highlight some specific challenges with using the TPC tool, and most frequent of these related to TPC battery life. The fully charged TPC battery life was apparently 4 hours; however David found this was not necessarily the case. There was a potentially significant difference between the amount of time indicated on the battery life icon and the actual amount of battery time. The battery life icon flashed green when fully charged, yellow when half charged, and red when in need of recharging, although this icon was small and easy to miss. However, the reduced battery charge had implications for usability, as the TPC screen would dim and the intranet connection to the Learning Gateway would become increasingly disrupted. Moreover, a machine on low battery would occasionally rapidly lose all remaining charge and, with it, connection to the Learning Gateway. Whilst work David completed on the TPC hard-drive would be auto-saved, his work would be lost if connected to the Learning Gateway. Consequently, David carried with him a TPC PSU. Whilst carrying a PSU did not appear to be a major difficulty it certainly added to David's workload, as permanently carrying the PSU added to the items David had to move from location to location.

The object of SAA was for the virtual tutor system to mediate part of David's, and the schools, commitment toward ECM and raise academic achievements. The object of increased efficiency in the school's pastoral care system (allied with the location of pastoral responsibilities within curriculum time) resulted in a radical reorientation of the school's pastoral care system and David's role in it. The object of the SAA activity system was mediated by the technology at the school - for example CMIS mediating access to centrally held data empowered David with real-time data. However, the object was also transformed from one of pastoral care, to one of pastoral care being linked to examination performance. Consequently, David experienced frustration at the removal of a pastoral element of his activities, and countered this frustration with his self-motivation to remain as a pastoral support for students.

The SAA community was also mediated by technology supported communication. The increased number of members of the SAA community (resulting from ECM) required technology to become more prominent in the pastoral care model. The Learning Gateway mediated external agencies, such as the Social Services and Police, to access CMIS and e-portal information, with the result that technological demands became more pronounced. Whilst David supported ECM, he was concerned about the potential for disconnection between members of the SAA community. Technology seemed to be over relied on in SAA, an over reliance which potentially disconnected, rather than connected, David to the community.

With the ECM demands of the SAA system, and the use of a more inter-disciplinary approach to pastoral care, the division of labour was decreased as David's pastoral workload was significantly reduced. SAA led to David having more time to commit to his academic responsibilities. David was anxious that redistributing his time demands from the pastoral to the academic appeared to bring into question the effectiveness of the school's pastoral care. David's concerns were reflected in the lack of students' engagement with SAA technology such as WLH, and how this manifested in David's lack of confidence that SAA was meeting students' pastoral needs.

The rules of the SAA system, particularly those relating to e-safety, appeared to be central in students' lack of engagement with the SAA system. David claimed students did not use WLH because of what they saw as an environment where their email traffic was open to surveillance from the school. However, the school had a responsibility for students' e-safety (particularly with regard to email systems). Consequently, the lack of students using WLH to communicate with David - and the pragmatics of the system in practice which meant that he was the SAA of students he did not teach - led to a potentially serious breakdown in pastoral communication.

I have represented the SAA activity system in Figure 5.4, and identified a contradiction between the SAA subject and object. My analysis of the data indicated that the SAA object of mediating the school's commitment to ECM was at the expense of pastoral relationships, and resulted in a tension with the subject of the system. SAA had the object of addressing a 'joined-up' pastoral care strategy and increasing learning time by including pastoral care within

curriculum time. However, the contradiction between subject and object revealed a tension between the advantages of increased curriculum time and the disadvantage of reduced pastoral time.

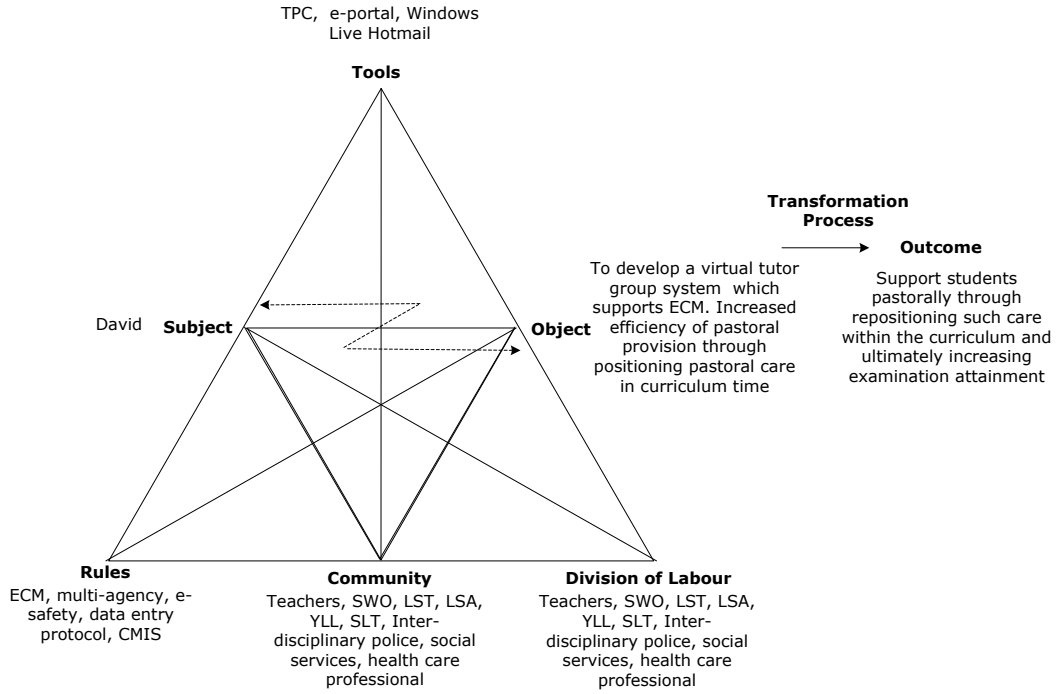

Figure 5.4 SAA activity system

David's concern with the SAA object was that it represented the school reneging on its commitment to support students' emotional wellbeing. SAA had a core object of acknowledging ECM, whilst also positioning pastoral care within the curriculum context and increasing learning time. This was in stark contrast to David's model of pastoral care which was concerned with both personal *and* social growth. Whilst it could be argued that SAA still addressed academic growth, the neglect of holistic social growth was part of the subject-object conflict.

Although the contradiction I suggest is between subject and object, it could also have been located between object and community. David claimed that the tutor group was a central part of a school's community, a community which did not exist in SAA. Whilst David acknowledged the improbability of a 'perfect' pastoral care system (and suggested that such previous systems at Brampton left much to be desired) the object of increased curriculum time in SAA – which resulted in the removal of the tutor group - was contradictory to the object of the

activity. Consequently, the prominent meditational role of technology in SAA, and the redefinition of pastoral care at the school, resulted in a system where David was prevented from attaining his object.

5.3 Summary of key themes chapter 5

In this chapter, I have recognised two different activities which David took part in and which had technology as prominent tools. I have examined these activities through a contextual lens which supported my identification of activity systems. The contextual lens revealed concepts relating to technology mediating the reorientation of working practices and norms. I developed two overarching categories from the contextual data – 'technology and control', and 'technology and relationships'. I have examined how the technological mediation of certain activities underpinned David's deep dissatisfaction with the 'for-us' or 'against-us' culture he claimed was part of the school's relationship with technology. I have examined how technology mediated both David's professional and moral responsibilities. I have revealed tensions between the 'standardisation' of different parts of his work, and that of other informants, and the un-standardised nature of many of the tasks.

The systems analysis revealed how the technology which mediated PMR appeared to prevent David from attaining his object as much as supporting him. I discussed how e-portal had appeared to have taken on such an essential meditational role that teachers had become over reliant on its applications. In contrast, I explored how the expected utilisation of WLH was not reflected in its actual use, and how this impacted on the system it mediated. From the activity system models I identified contradictions in these systems. In the case of PMR the contradiction was between tools and object; for SAA the contradiction was between subject and object. I have examined the consequences of these contradictions on David's ability to attain his object, and explored how these contradictions manifested in different tensions. For example, I discussed how technology, such as DDLs (which were designed to make the PMR system quicker and easier to use), mediated how teachers engaged with the process.

My combination of a contextual and systems analysis of David's experiences of using technology revealed how mediation by tools such as e-portal and the Learning Gateway redefined the two activities studies here. Moreover, in investigating these tools, my analysis has begun to suggest that the technology mediating both the PMR and SAA systems did not necessarily result in David attaining his object.

Chapter 6: Integrating the analysis

Synopsis of Chapter 6

In this chapter I present an overview of my analysis of Nicola and David's experience of technology and establish 'petite generalisations' (Stake, 1995, p. 7) from these experiences. In the first section, I examine the key informants' contextual data. I discuss the resonances between the concepts I identified in Nicola and David's data, and then assign these concepts to the four overarching categories I identified in the previous two chapters - technology and trust, technology and control, technology and relationships, technology and truth. I explore data in each category, and establish statements which encapsulate Nicola and David's contextual experiences of both teachers. For example, both teachers experienced technological systems as mediating changes in how they were trusted as teachers. Both teachers suggested that there was a 'blind-faith' in technology at the school and that scepticism of such technology was seen as an off-message activity. For both Nicola and David, uncritically trusting technology, data, and systems reflected an environment which increasingly ignored the emotional, ephemeral and unquantifiable.

In the second section I complete a process similar to that of the first, in this case synthesising my analysis of the four activity systems I discussed in chapters 4 and 5. I begin by summarising the objects of the four activities, and identifying the tools which both Nicola and David used to mediate their activities. I establish if these tools are hardware, software or Internet-intranet-portal systems. I then examine the position of technology in the contradictions which prevented these teachers from attaining their objects.

The concluding stage in this chapter is to develop a generalised model of educational technology mediation. In this model, I examine similarities in technological mediation on the objects, rules, communities and divisions of labour components of the key informants' activities. This process leads to an understanding of the presence of certain experiences of technological mediating tools which were shared by both teachers.

6.1 Introduction

In this chapter, I establish a 'database' (Lincoln & Guba, 1985, p. 316) where I synthesise the analysis I presented in the previous two chapters. The object of this synthesis is to identify 'a broader set of recognizable features' (Williams, 2000, p. 215) which can be applied to both teachers' data. I am claiming some legitimacy and 'viability' (Gates 2000, p. 458) in generalising from one of the key informant's experiences of technology to the other. In doing so, I begin to suggest why both these teachers have similar experiences of educational technology.

Some of the concepts and categories evident in my contextual analysis are transferable and applicable to both teachers. For example, both Nicola and David discussed the effect of technology on mediating conditions of trust and how this technological reorientation of what was trustworthy (and what was not) impacted on the activities in which they participated. In relation to their activity systems, both teachers also claimed that a tool such as e-portal had mediated changes to the extent to which their professional opinion was trusted. From drawing on Yammagata-Lynch's (2010, p. 32) activity theory model, I have identified how both Nicola and David shared some of the mediating effects of technology on objects, rules, communities, and divisions of labour. For example, both teachers experienced technology as redefining the rules of activities in similar ways – technology mediated 'traditional' pedagogical rules, and challenged their personally held rules defining teaching and being a teacher; this ultimately led to the use of technology itself becoming a rule.

I am not claiming that the generalisations I discuss in this chapter reflect 'universal' transferable laws which can be applied collectively to every instance of educational technology use at Brampton High. However, there are similarities between my findings and those of other researchers examining educational technology (see for example, Neil Selwyn 1999, 2002, 2010; Larry Cuban 1986, 2001; C.A Bowers 2000; Rob Kling 1996a; and Neil Postman 1992). Despite these similarities, I am only concerned with making 'petite generalizations' (Stake, 1995, p. 7) applicable to the teachers in this study, and the school in which it is set.

6.2 Contextual generalisations

I have restricted my contextual generalisations to the four categories that emerged from the data - technology and trust, technology and control, technology and relationships, technology and truth. I have synthesised the emergent concepts and the categories I discussed in Chapters 4 and 5 in Table 6.1. From this table, the interconnection between concepts can be seen across the four categories. For example, the 'standardisation' concept relates to the technology and trust category, whilst also resonating with the 'regime of truth' concept positioned in the technology and control category.

	Stage 1: Grounded theory analysis
Categories	**Concepts**
Technology and trust **(MAM)**	Micro-level – trust, control, standardisation, consistency, excluding, including, integrity, fear, reorientation of rules, professional opinion, imposed collegiality, loss, resentment, surveillance, distrust, trust, comparison, professional identity, imposition, rules Macro-level – trust, professional identity, standardisation, consistency, integrity, rules, opinion, imposition, surveillance
Technology and control **(PMR)**	Micro-level – control, support, stress, time, 'backing up', working against the system, home life v work life, performance management, commitment, professionalism, fabrications, 'playing the game', opinion v data, representation, strategic compliance, values, splitting, voluntary and egalitarian v corporate, 'clandestine voices', 'hidden parts', transparency, relationships, failure, guilt, constant change, success, 'regime of truth', targets, competition culture, 'symbolic existence', normalisation, blame, fault finding Macro-level – control, competition, fabrications, playing the game, splitting, data, work/home balance
Technology and relationships **(SAA)**	Micro-level – relationships, interrelated, e-portal, pastoral care, virtual tutor, 'powerful tool', 'first stop', 'made life easier', 'anything but user friendly', complex, 'increasingly difficult to use' ,crucial, inaccurate data, reliant, over reliance, 'school falls apart', reorientation of norms, 'first port of call', face-to-face meeting, lack of communication , 'kids don't use it', checked up on', e-safety, moral responsibility, self-government, where-with-all, 'slip through the net', professionalism, technology driven, subordination Macro-level – relationships, communication, pastoral care, technological choice, surveillance, learning time, e-safety
Technology and truth **(RTR)**	Micro-level – truth, legitimacy, fabrications, freedom of information, community, disempowerment, transformation, agency, self-determining, in it together, appropriateness, betrayal, communication, commodity, fraud, lying, devalue, trauma, dialogue Macro-level – truth, legitimacy, fabrications, community, disempowerment, appropriateness, spending

Table 6.1 Concepts and categories

In this following section, I discuss the relationships between technology and these four categories and in doing so I have been able to develop structural accounts of the key

informants' experiences of technology. For example, I describe how both teachers have experienced technology as a means of mediating control and the consequences of this control on how they see themselves and their professional identities. Similarly, I illustrate how Nicola and David have experienced technology mediating detrimental effects on professional relationships. I suggest that there is a 'blind faith' in technology at the school; that technology has an inherent possibility for mediating clandestine surveillance; that teachers experience tensions between relationships located in the virtual and physical worlds; and that a technologically mediated system of power produces and sustains only a technological version of 'truth'. From these analytical generalisations, I am able to develop and support my analysis of the key informants' activities which I discuss in the concluding section of this chapter.

Technology and trust

When I examined the technology mediated conditions of trust, the data suggested that rather than focusing on trust *of* technology, more prevalent was the extent to which technology mediated how much Nicola and David were *themselves* trusted. In Table 6.2, I have grouped together the concepts from both key informants' data relating to the 'technology and trust' category. For example, Nicola claimed that just because data was mediated by a computer that did not necessarily mean that data was trustworthy. Both teachers were critical that the mere act of representing data on a computer elevated the worth and importance of that data. Moreover, data that computer systems were not designed to process, that equating to the emotions for example, became of less worth and importance; not because it had ceased to impact on the lives of teachers and students, but because the technological systems at the school did not mediate the use of data pertaining to these areas of human experience.

Presenting data on a computer screen appeared to elevate the importance, and worth, of that data – as Bowers (2000, p. 71) comments, 'everything on a computer screen is given technological equality'. Both key informants identified Brampton High as having a 'blind' acceptance of technological mediated information – technology was trustworthy and technologically mediated justification of the school and teachers' success was both objective and unambiguous.

	Category - Technology and trust
Activity	**Shared concepts**
(MAM)	control, standardisation, consistency, integrity, reorientation of rules, professional opinion, imposed collegiality, surveillance, distrust, comparison
(PMR)	'backing up', working against the system, performance management, fabrications, 'playing the game', opinion v data, representation, strategic compliance, values, transparency, fault finding, 'clandestine voices'
(SAA)	over reliance, 'school falls apart', 'checked up on', e-safety, moral responsibility, subordination
(RTR)	fabrications, in it together, appropriateness, betrayal, communication, fraud, lying, devalue, trauma, dialogue

Table 6.2 Technology and trust shared concepts

Nicola and David reflected both on their practice, and on the school as a whole, and it was this reflection, which was part of their scepticism toward technology being a 'simple panacea' (Rudd, 2001, p. 219) for educational woes. Both teachers also challenged a climate of uncritically and 'overly-trusting' (Slavitch, 1996, p. 766) technology. My analysis suggested that for both teachers, there were multiple occasions where technology malfunctioned, or did something it should not. However, these were technical issues of trust - although clearly reliability does have an impact on whether technology is experienced as being trustworthy or not - not necessarily ontological issues of belief and faith.

Both Nicola and David were concerned that once events had been quantified and turned into data the stories behind the numbers were not critically engaged with. Technology mediated systems where data was *fundamental* and consequently beyond scepticism. The lack of technological scepticism described by both teachers, is at odds with the importance of what Crawford (1996, p, 594) calls the need for a 'healthy scepticism' amongst users of technology. Although Nicola and David appeared to demonstrate such scepticism, they were not necessarily happy about how such scepticism was viewed. Both teachers discussed how being critical of technology appeared to be regarded as being critical of the school, its ethos, and management team. This was an important point, as the key informants felt that an overt and

professional dialogue regarding technology was missing - instead these teachers unhappily resorted to private conversations.

Perhaps Nicola and David's reticence in talking openly about the issues they had with technology and trust was unsurprising - the implications of such scepticism could be catastrophic for the school. For example, if the technologies mediating MAM were to be revealed as untrustworthy, there would be wide-ranging and serious implications for everyone in the school. SLT would be put in an untenable position if the data they supplied to BTEC (and by extension the LEA, Government and OfSTED) were seen to be untrustworthy. However, trust was not exclusively about trusting technology and data. The key informants' concerns related to technology and trusting teachers. What David suggested was that the technology appeared to mediate *distrust* of teachers. Both Nicola and David claimed technology mediated the degree to which they felt the school's management trusted them.

Nicola and David maintained that the overriding discourse was that technology was trustworthy, data was trustworthy, analysis of quantifiable data was trustworthy and, by extension, everything else less so. This was particularly the case in relation to the ephemeral, and the difficult to measure or quantify. These teachers suggested that technology had no place for these phenomena, and in doing so indicated rejection of professional trust. The key informants' position was that uncritically trusting technology also meant embracing data mediated representations of performance, whilst simultaneously relegating the emotional and ephemeral from the educational lexicon.

Technology and control

The relationship between technology and control can be seen as part of the increasing prevalence of what Postman (1993, p. 71) calls 'technopoly'. In technopoly, technology has become so embedded in human activities that 'culture seeks its authorization in technology, finds its satisfactions in technology, and takes its orders from technology' (Postman, 1993, p. 71). Critical in technopoly is the centrality of data and the importance, and availability, of information:

> As the supply is increased, control mechanisms are strained. Additional control mechanisms are needed to cope with the new information. When additional control mechanisms are themselves technical, they in turn further increase the supply of information. When the supply of information is no longer controllable, a general breakdown in psychic tranquility and social purpose occurs. (Postman, 1993, p. 72)

The interrelated nature of technology and information resonated with the key informants' claims regarding technology as mediating control. For both teachers, that technology mediated increasingly large amounts of their activities meant they did not experience increased freedom, only more control. The key informants' comments reflect the 'new politics' (Fisher, 2007, p. 523) of technology, and its role in mediating control of civil service workers - rather than technology benefiting workers and managers, it restructured conditions, rules and working practices of workers to increase efficiency and production. Nicola talked about control in relation to MAM, and David in relation to PMR which, in both cases, reflected technologically mediated 'top-down managerial control' (Winner, 1996, p. 83).

In Table 6.3, I have indicated the shared concepts in the 'technology and control' category. Technology and particularly computer technology, can readily mediate an organisation where:

> For those that mange the systems of computerized work, the structures and processes offer a wonderfully effective means of control. Here is an electronic equivalent of Jeremy Bentham's Panopiticon... (Winner, 1996, p. 84)

Technology, as much as mediating freedom, can also mediate a controlling environment. Both teachers talked about just this movement from technological freedom to technological control, and how technology appeared to mediate increasingly prescriptive managerial systems. However, for Nicola and David technology and control were more than issues of management – rather they were issues of empowerment and disempowerment. For example empowerment might be functional, in terms of performance, efficiency, and being empowered to be the best teacher possible. However, empowerment might also be concerned with individuals having a greater control over their own lives, what Clement (1996, p. 385) describes as teachers having a greater 'grasp and sense of their own power'. As Nicola claimed, her attempts to 'wrestle control' from technology was not a challenge to technology *per se,* nor to the school's management, more it was an attempt to resolve technology mediating conditions which were overly controlling of her and her practice.

	Category – Technology and control
Activity	**Shared concepts**
(MAM)	standardisation, consistency, reorientation of rules, professional opinion, imposed collegiality, surveillance, distrust, trust, comparison, imposition, rules
(PMR)	performance management, commitment, professionalism, fabrications, 'playing the game', strategic compliance, values, splitting, , failure, guilt, targets, competition culture, 'symbolic existence', normalisation.
(SAA)	virtual tutor, over reliance, 'school falls apart', reorientation of norms, lack of communication , 'kids don't use it', 'checked up on', e-safety, moral responsibility, subordination
(RTR)	legitimacy, fabrications, disempowerment, transformation, agency, commodity, fraud, lying, devalue, trauma, dialogue

Table 6.3 Technology and control shared concepts

For the key informants, central to the meditational relationship between technology and control, was technology as a means of surveillance. Although these teachers were not advocating what Kling (1996a, p. 286) describes as 'electronic prisons', for Nicola and David, the technologically mediated monitoring of what was happening in the school (and that they knew this monitoring was taking place) imparted a Panopticised model of omnipresent surveillance (Kling, 1996a, p. 286). Technology became an example of the 'paraphernalia of control' (Ball, 1990a, p. 155) due to technology mediating tremendous opportunities for surveillance and, with it, control. For example, the technology of the Panopiticon was specifically designed to mediate an omnipresent model of observation (Foucault, 1991, p. 201). Nicola and David maintained that, the omnipresence of technological surveillance was both de-motivating and intrusive.

It could be argued that technology mediates transparency and with it openness and freedom. In contrast, David suggested activities such as MAM and PMR did not result in teachers' freedom but teachers' control. Brampton's environment of technology-mediated control mediated changes in Nicola and David's professional identities. These teachers felt technology mediated an environment which was less professional, more controlled and observed, and ultimately disenfranchising. Despite these concerns, both Nicola and David were resilient and

they coped. This coping was reflected not just in their ability to adapt, but also in their resistance to some parts of technology through what Giddens (1985, p. 11) positions as 'counter-strategies'. By resistance I do not mean any particularly organised actions toward subverting technology; rather resistance in the form of awareness of the implications of technology. Nicola and David's resistance was not blindly following technology, but critically engaging with it.

Technology and relationships

For both Nicola and David, the transformational effect of technology on professional relationships mediated changes in these relationships from close, supportive and effective, to formal, functionary and distant. Technology mediated redefinitions of professional opinion and professional identity. The professional relationships which both teachers valued were based on a collective vision, a vision where teachers were 'in it together' no matter what their differences. Technology has mediated a culture based on an increasing number of indirect relationships and fewer direct ones (Kling, 1996a, p. 427). Nicola and David's experiences suggest that the levels of indirect communication mediated by technology (email, Skype, Facebook, Twitter) resulted in a reduction in direct face-to-face communication. This has manifested in a culture of reduced physical-world professional relationships.

As with the differences between physical world and virtual world relationships, the idealised view of technology - mediating for example the virtues of greater communication and with it enhanced relationships - is reflected in the metaphors of technology. In Chapter 2, I explored the 'metaphor of community' (Achinstein, 2002, p. 6); that is, how enforced, professionalised and modernised communities of teachers represented a symbolic representation of a new model of community. Like the metaphor of community, metaphor can relate to technology, for example the Internet being described as the 'information superhighway'. However, such metaphors appear to present a misrepresentation of technology. Positioning technology as mediating a superhighway appeared to ignore traffic jams, stress, air pollution and the depletion of fossil fuels prevalent in rush hour car travel (Sclove & Scheuer, 1996, p. 606).

Metaphors such as information superhighway misrepresent how technology mediates culture and social relationships. These misrepresentations, between an idealised view of technology and the realities of its use, resonated with my analysis of Nicola and David's data. For example, the PMR technology mediated the object of making a more efficient and easy to use model of performance management. The reality was that Nicola and David spent more time after school entering data because of technological difficulties, which reduced efficiency and detrimentally impacted on their work-life/home-life balance.

	Technology and relationships
Activity	**Shared concepts**
(MAM)	consistency, excluding, integrity, fear, reorientation of rules, professional opinion, imposed collegiality, distrust, comparison, professional identity
(PMR)	working against the system, home life v work life, performance management, fabrications, 'playing the game', strategic compliance, values, splitting, voluntary and egalitarian v corporate, 'clandestine voices', transparency 'regime of truth', targets, competition culture, 'symbolic existence', normalisation, fault finding
(SAA)	e-portal, pastoral care, virtual tutor, crucial, over reliance, 'school falls apart', face-to-face meeting, lack of communication , moral responsibility, self-government
(RTR)	legitimacy, fabrications, freedom of information, disempowerment, self-determining, in it together, betrayal, communication, commodity, trauma, dialogue

Table 6.4 Technology and relationships shared concepts

In Table 6.4, I have given an overview of the concepts present in both teachers' data which resonated with the 'technology and relationships' category. For Nicola and David, as much as technology mediated communication, it also changed what communication was. Both key informants positioned computers, and hard data, as becoming the focus of the school - and the retreat of 'narrative knowledge' (Lyotard, 1979, p. 18) in the face of 'hard' facts – and insisted the erosion of the importance of professional relationships was linked to the increased importance of technology and data. Both teachers discussed how teachers' communities were based around relationships between people in the physical world, and that the increased

number of virtual world communication technologies appeared to reduce physical world relationships.

The distinction between the physical world and virtual world was an important one. For the Key informants, virtual communication via email, Skype and Facebook should be an addition to, and not a reduction of, physical world communication. Both Nicola and David had Facebook accounts, both texted, emailed and Skyped. Yet their understanding of relationships and communities appeared based in the physical world as much as the virtual. The social relationships, in a technology-mediated world of electronic forums, appeared to reflect a search for a sense of community to counter the 'negative effects of electronic communication on social life at work' (Markus, 1996, p. 490). For Nicola, the negative social impact of technology was seen in the strain on teacher-colleague relationships in MAM; for David the technology mediating SAA reduced the importance of the tutor-tutees relationship. In both cases, the key informants claimed that in some instances technology (be it the intended or unintended consequence of its mediating role) significantly reoriented professional relationships for the worse.

Technology and truth

The relationship between knowledge, technology and truth can be seen in technological mediation of the 'legitimation of knowledge' (Lyotard, 1979, p. 27) - the circumstances of truth have become positioned within the epistemological boundaries of science and technology. In doing so, such positioning negates the importance of narrative knowledge based on experiences, values and beliefs which technology has difficulty with quantifying and processing. For Nicola and David, the focus on data that could be easily stored and manipulated in the language of computers ignored the importance of the ephemeral, emotional and qualitative and raised questions regarding the link between technology and truth:

> Technology imperiously commandeers our most important terminology. It redefines "freedom", "truth", "intelligence", "fact", "wisdom", "memory", "history" – all the words we live by. And it does not pause to tell us. And we do not pause to ask. (Postman, 1993, pp. 8-9)

	Category - Technology and truth
Activity	**Shared concepts**
(PMR)	working against the system, performance management, fabrications, 'playing the game', opinion v data, strategic compliance, 'clandestine voices', transparency, constant change, success, 'regime of truth', targets, competition culture, 'symbolic existence', normalisation, fault finding
(SAA)	inaccurate data, over reliance, 'school falls apart', reorientation of norms, 'kids don't use it', checked up on', e-safety, moral responsibility, self-government, where-with-all, technology driven, subordination
(RTR)	legitimacy, fabrications, freedom of information, , agency, self-determining, appropriateness, communication, commodity, fraud, dialogue

Table 6.5 Technology and truth shared concepts

Both key informants were concerned about how technology appeared to be redefining what truth meant at the school; comments which again echo Postman's position:

> …new technologies change what we mean by "knowing" and "truth"; they alter those deeply embedded habits of thought which give a culture its sense of what the world is like. (Postman, 1993, p. 12)

As I have indicated in Table 6.5, the concepts from the key informants' data paint a picture of technological systems and tools working against, rather than mediating, these teachers' understanding of truth - both teachers accept that truth is subjective and as such possible to multiple interpretations:

> …truth is a thing of this world, it is produced only by virtue of multiple forms of constraint. And it induces regular effects of power. (Foucault, 2003, pp. 252-253)

Truth is 'a system of ordered procedures' (Foucault, 2003, p. 253) and positioned within one's own epistemological and ontological assumptions. Consequently, for technology to be positioned as a tool mediating *the* truth (as it appears to be at Brampton High) there follows a rejection of anything outside of technology as truthful.

Positioning truth as centred on 'scientific discourse and the institutions which produce it' (Foucault, 2003, p. 252) reduces the importance of narrative knowledge, and increase the importance of scientific knowledge. For the key informants, 'technological truth' had appeared to surpass any other form of truth no matter how seemingly appropriate that truth might be.

Truth is produced, transmitted, and controlled, by relatively few 'great political and economic apparatuses' (Foucault, 2003, p. 252) - Nicola and David's data suggest that in the case of Brampton, these tools were primarily technological. The importance of technology at Brampton High deemed that what was true was located within a technological framework, mediated by a technological language, represented by technology, and with no room for teachers' professional, and subjective, opinion. For both key informants, the role of technology in superseding what might be years of experiences in lieu of 'evidence' undermined their professional identity. What these teachers held as their professional experience and knowledge became increasingly devalued, and in doing so resulted in an 'internalization of perspective' (Moll, 2005, p. 282) – they internalised their professional opinions as these opinions were not considered to have worth without technologically mediated means of presenting 'hard' quantifiable data.

The tensions these teachers experienced from what Nicola called a "regime" of surveillance, allied to the positioning of learning as a commodity resulted in both teachers feeling that they were a "fraud". Technology has led to 'aggressive efforts to commodify activities, forms of knowledge and social relationships' (Bowers, 2000, p. 74). The key informants claimed their experiences of technology reflected the commodification of learning, schools and education at the macro-level. The need for constant success resulted in technology being dominant in effectively, efficiently and, crucially, *realistically* projecting the school's achievements.

Contextual overview

In Table 6.6, I have presented an overview of analytical generalisations emerging from my analysis of contextual data. I have related these generalisations to the categories of technology and trust, control, relationships and truth. The first of these categories is technology and trust. Both key informants suggested that underpinning the relationship between technology and trust was 'blind faith' and a lack of critical awareness of the meditational impact of technology at their technology-laden school.

	Contextual overview
Technology and trust	There is a blind-faith in technology at the school Scepticism of such technology is seen as an off-message activity Uncritically trusting technology, data, and systems is un-trusting of teachers
Technology and control	Technology reflects, and sustains, an electronic Panopiticon Technology is controlling Technology has an inherent possibility for being a clandestine surveillance tool
Technology and relationships	Technology renders relationships formal, functionary and distant Narrative knowledge is retreating in the face of scientific, technological, knowledge Tension between technology and relationships in the virtual and physical world
Technology and truth	Truth is only technological, not narrative, in its representation The representation of truth reflected in technology as the dominant discourse Truth is significant in a technological system of power, which both produces, and sustains it

Table 6.6 Contextual analysis overview

> Most policy makers, corporate executives, practitioners and parents assume that wiring schools, buying hardware and software, and distributing the equipment throughout will lead to abundant classroom use by teachers and students and improved teaching and learning. (Cuban, *et al*., 2001, p. 813)

These promises of 'improved teaching and learning' have not been borne out in practice (see for example Selwyn, 1999; Zaho *et al.,* 2001; Cuban, 2001), and have led to Nicola and David highlighting confusion between what proponents of technology promised it could do, and what it does do, in use at their school. However, for these teachers there appeared to be an undercurrent to technological trust, which positioned criticism of technology as more than just critiquing the effectiveness of a tool. The environment at the school was that criticism of technology was a criticism of the school itself - criticism of technology was seen as an 'off-message' activity.

I am not suggesting that Nicola and David suffered a managerial regime where criticism was unheard of. Neither of these teachers (nor any of the other informants I spoke to) described the school's management as autocratic, for example, consultation was a regular process. However, technology seemed to be beyond critical conversation. Technology was situated as so essential to the school that the implications of technological false promises seemed to be

outside the scope of professional critical dialogue. The school's management addressed difficult issues and were proactive in assessing and reviewing their decision making in seemingly all areas of the organisation bar one - technology.

Establishing technology and data as the prominent means of mediating the justifications for educational polices, results and 'success' affected how these two teachers felt *they* were trusted. They claimed technology was positioned as an efficient, quick and statistically accurate means of disseminating information – and ultimately seen as more trustworthy than relying teachers' opinions. This brought into question both teachers' reliance on experience, subjective knowledge and values – and in doing so suggested that technology was *separate* from values:

> …computer-mediated data and information strengthens the modern belief that objectivity and fact are separate from values. (Bowers, 2000, p. 72)

Nicola and David both claimed that technology re-orientated their professional values. The use of technology to mediate the presentation of statistical data evidencing teachers' success ignored the 'back story' underpinning this data. The achievements of a student in relation to their (statistically generated) performance did not tell the story of the challenges facing that student. Moreover, the technological model appeared to be removing the systems and norms which acknowledged subjectivity – technology was positioned as objective and value-neutral.

The challenges facing Nicola and David in part stemmed from how they felt technology mediated conditions which were controlling, them and their practice. Kling discusses 'electronic prisons' (1996a, p. 286) and whilst this might be an emotive metaphor, both teachers subscribed to the controlling and 'imprisoning' effects of technology. Like authors such as Ball (1990b), I drew on Foucault's (1991) examination of the Panopiticon with regard to the relationship between technology and control. In the Panopticon, the threat of being constantly observed was successful at controlling the actions of those under surveillance (Foucault, 1991, p. 201). The key informants' claims support the notion that surveillance that has become more prominent in the UK education system has impacted on teachers' identity:

> …uncontentious technologies of hierarchical observation, judgment, normalised to an inspector's eye view and the Ofsted 'examination' become for some teachers, the everyday conditions which mould their professional identities and sense of purpose. (Hall & Noyes, 2009, p. 855)

The Panopiticon model leads to the observed being 'the object of observation never a subject in communication' (Foucault, 1991, p. 200). Whilst both Nicola and David felt that they were able to communicate with their peers about the school, the prevalence of 'virtual' communication was itself a means of observation. Both teachers felt that they could not 'speak their mind' on email for fear of the contents being brought into the public sphere; comments which resonate with the constant and permanent visibility of those within the Panopiticon assuring 'the perfection of power' (Foucault, 1991, p. 201). Both teachers felt that technology was a means of automatically mediating the power relationship between teachers and mangers.

For Nicola and David, this was not a discussion of surveillance *per se*, for example both key informants were advocates of classrooms with 'open doors', of peer observations, and of teachers' accountability. However, it was the specific observations mediated by technological tools, which was redefining both teachers' practice in terms of technological control. That technology had capability for surveillance was itself not a major concern for these teachers – indeed David talked of being 'used to a 24-hour' surveillance culture. What concerned these teachers was the effect of the potential for technological observation on the structures, values and rules they both held as important to them as teachers.

Technology as a tool of control also mediated a reorientation of Nicola and David's professional relationships. The key informants discussed how technology rendered relationships formal, functionary and distant. Moreover electronic communication mediated reductions in face-to-face communication at the school. Electronic communication should not be supplementary for face-to-face bonds (Sproull & Keisler, 1996, p. 474); however, this appears to have been just the situation at the key informants' school. Relationships situated in the virtual world took on a different meaning from those in the physical world. Technology mediated the opportunity for communication between teachers not just via email, but also via social media, which in a split site school was positioned as mediating professional relationships. In practice, technology mediated the divisions between sites – tools such as e-mail reduced the need for face-to-face meetings - with teachers less inclined to physically meet with colleagues.

Moreover, the use of email communication was part of setting up a 'trail', which could be followed at a later date. Nicola talked about how constant emailing appeared to situate a large proportion of teachers' time in answering and responding to tasks outlined in emails, and then writing emails to confirm the action that they had taken. The email culture at the school was part of the challenges facing these teachers' professional relationships. The increased reliance on, and demands of performance maximisation rendered electronic communication as crucial in this process. However, the social and cultural consequences of such a reliance on virtual world communication did not appear to have been considered.

Both Nicola and David lamented the reduction in the social and cultural fabric of teachers' professional relationships. For example, David insisted that with the increase in the prevalence of technology mediating teachers' activities the demands on teachers' time had also increased. For both teachers, the relationships which held the school together were being devalued in lieu of a more mechanistic and technological view of teaching and teachers. The 'learning relationships' between teachers and students were being distanced because of the increasingly central role of technology; such relationships are vital because such long term bonds are fundamental in learning:

> …you can know the academic standards inside and out, and write the most creative lesson plans, but if positive, affirming, and mutually respectful relationships are not the norm in our classrooms, no learning will take place. Even academic knowledge must be distributed through social relations. (Amanti, 2005, p. 140)

For the key informants, technology was widening the gaps between teachers and their colleagues, and teachers and their students. For example, both teachers discussed how more of their colleagues spent non-contact periods engaged in tasks mediated by computer technology, and in doing so the camaraderie amongst teachers had appeared to become less important. On many occasions staffrooms were completely silent as teachers were occupied by tasks mediated by their TPCs.

As with technology mediating relationships, it also had a significant effect in mediating data reflecting what was happening at the school. Selwyn writes that educational technology research should examine the 'state-of-the-actual' (2010a, p. 70) - for the key informants, discussing the relationships between technology and truth was just such an examination. For

example, how technology was positioned as mediating a 'truthful' representation of the school resonates with the 'organic connection' between technology and truth (Lyotard, 1979, p. 47) – indeed, technology has redefined truth in terms of the production of proof which can only be evidenced through technological means.

Technology mediates the production of proof itself, leading to an elevation of the 'best possible input/output equation' (Lyotard, 1979, p. 46) of performativity. For both key informants, proof of educational success has become the object of many of the activities in which they took part. Nicola and David claimed that technology had reduced the importance of the emotional and ephemeral in terms of students' learning, instead to be replaced by an objective technology mediated focus on targets and performance – a view reminiscent of Lyotard's position that organisations have had to 'abandon the idealist and humanist narratives of legitimation' (1979, p. 46) in order not to find truth but to augment power. Both key informants indicated that the school had become a technologically mediated system where proof of educational success (exclusively represented by academic achievement) was produced by and sustained the importance of, technology. Technology mediating performativity leads to a greater production of proof which ultimately 'increases the ability to be right' (Lyotard, 1979, p. 46). In Nicola and David's case, the ability to support claims to be right almost had to be always mediated by technology.

Brampton High (like all other state schools in England) had to produce data so that the Government agencies, such as OfSTED, were able to assess and grade the school in relation to certain criteria. Technology was positioned by the school as central in mediating this process - the assumption of both the school's leadership team and the Government was that technology would invariably transform achievement. However, as much as the Government had the power to reward schools for their performance, it also had the power to sanction 'underperforming' schools. Consequently – and so as to prevent being labelled as underperforming - technology was established by both the management, and some teachers, as the prominent tool mediating the legitimation of the school's success.

For Nicola and David, technology was the dominant discourse of proof, legitimation and truth and yet technology had been shown to rely on fallible information from fallible human beings. Despite this, technology was part of producing an environment of proof and legitimation:

> Since "reality" is what provides the evidence used as proof in scientific augmentation, and also provides prescriptions and promises of a juridical, ethical and political nature with results, one can master all of these games by mastering "reality". This is precisely what technology can do. By reinforcing technology, one "reinforces" reality, and one's chances of being just, and right increase accordingly. Reciprocally, technology is reinforced all the more effectively if one has access to scientific knowledge and decision-making authority. (Lyotard, 1979, p. 47)

The parallels between Lyotard's thesis and the technological state-of-the-actual at Nicola and David's school are stark. The 'reality', which portrays Brampton High as succeeding, relies on technology to mediate examples of proof, and represent this proof as evidence. In this model, technology is seen to supersede the wisdom, experience and beliefs of human beings. Nicola and David's experiences of technology correspond with the increasing importance of data storage and accessibility to information – for these teachers, the production of data has become the key focus at the school, key above relationships, friendships, emotional health and even learning.

Performativity is mediated by technological tools, but also sustains the centrality of technology in such a system. I am suggesting that an encapsulation of the key informants' contextual data reflects the fundamental role of technology at the school – fundamental not even in raising the 'academic achievement' of students, but in being a tool to both mediate, and demonstrate, the production of performative evidence and proof to legitimise the very existence of the school. For both teachers, technology was not fundamental in the school for mediating learning, but for mediating the indicators that positioned the school as successful.

6.3 Activity system generalisations

In this section I establish a synthesis of my activity theory analysis to develop a generalised model of technology in mediating the key informants' activities. Table 6.7 is a summary of the four activities I examined. All four activities share the prominent role of technology in their mediation, whilst leading toward outcomes redefining, varying or increasing the efficiency of the key informants' work. All of these activities were also located in demonstrating

'transformation' - transformation of moderation processes, transformation of school/parent communication; transformation of the school's performance management model; and transformation of pastoral care.

Activity	Summary of activity
MAM	Coursework moderation process supported by data storage protocol and the presentation of moderated module scores by individual teachers to the rest of faculty using LCD projector.
RTR	Innovative 'real-time' data dissemination from school to parents using Internet, intranet, email, SMS texting, SNS - Face book and Twitter. Redefinition of communication between school and parents.
PMR	Technology mediated performance management process with the use of statement banks accessed via drop down lists.
SAA	Intranet mediated virtual tutor group system with the prominent role of dedicated email service between significant adult and tutees, and the capacity for online communication and forums.

Table 6.7 Summary of activities

Central in this process of transformation was that these activities were a part of constant 'innovation' and, as such, employed innovative use of technology to mediate their objects. For example, the school's management heralded the use of texting and social networking in RTR and the implementation of 'virtual' tutor groups in SAA, as illustrations of such innovative uses of technology. However, this innovation did not necessarily result in the expected outcomes - there were instances where unexpected consequences (see Cuban, 2001, p. 131) threatened to jeopardise the very innovation these activities were designed to demonstrate.

The lack of students participating in virtual pastoral communities is one such example. Although the technology which mediated the SAA activity was technically appropriate, it was not socially or culturally appropriate. Students did not engage in virtual communities because they were concerned that their email communications would not be private. This was allied to the increased availability of Smartphones and social networking sites as forms of communication. The culture surrounding students' use of electronic communication changed so rapidly that what was once a frequent form of communication between students at the school (WLH) had become superseded. Consequently, the students' culture of using WLH, which was assumed to be a constant in SAA, was replaced by the use of Smartphones with the consequence that students' WLH email traffic significantly reduced.

In mediating innovation and transformation, these activities focussed on the outcomes of efficiency and performance and positioned technology as essential in mediating these outcomes. All four activities shared objects which ultimately led to an impact on Nicola and David's working practices and professional identities. These activities were not concerned with 'learning technologies' *per se* as none of them were linked with a particular practice or tool used directly in classrooms to mediate students' learning. However, all four activities shared an ultimate object of increasing academic performance. MAM was perhaps most obviously concerned with increasing student performance through the moderation of coursework. RTR mediated parents' access to data regarding attendance, punctuality and behaviour which were directly linked (through CMIS) with performance data. PMR linked student performance directly to teacher performance. SAA directed pastoral care through a focus on academic attainment. The implementation of these activities, which were designed to produce mechanistic and technologically enhanced approaches to Nicola and David's activities, mediated more than a reorientation of working practices. These activities had the outcomes of both directly and indirectly mediating increased the levels of regulation and control.

Identifying tools

As can be seen in Table 6.8, I have identified tools which have mediated the key informants' activities. I have placed these tools into three broad categories to help with identifying the specific mediating roles of these tools. The first category is hardware which contains the 'hard' infrastructure of wireless connections, PCs and TPCs, digital cameras, mobile phones, IWBs and LCDPs and so on. Hardware is the physical object that can be touched, held and seen. The second category is software. Software is the infrastructure of programming applications which provide the instructions for computer hardware. Software also relates to the data held on computers. Unlike hardware, software cannot be touched or seen and is an abstract term for processes, meanings or procedures. The final category is Internet-intranet-portal systems (IIPS). I have linked these three systems together as all three are necessary to mediate activities such as SAA. IIPS use the global system of private, public, academic, business and government computer networks which form the Internet. IIPS can also be in the form of Brampton's intranet system, the 'Learning Gateway', CMIS and e-portal.

Activity	Prominent tools
MAM	Tablet Personal Computer, 'mouse,' USB data storage device, Read-Only File, Liquid Crystal Display Projector, Learning Gateway Intranet Portal, CMIS, e-portal
RTR	Tablet Personal Computer, 'mouse,' USB data storage device, Internet, Learning Gateway Intranet Portal, e-portal CMIS, Short Message Service - Texting
PMR	Tablet Personal Computer, 'mouse,' USB data storage device, Touch Screen Electronic Visual Display, Graphical User Interface, Drop-down List, e-portal
SAA	Tablet Personal Computer, 'mouse,' USB data storage device, e-portal, CMIS, Windows Live Hotmail

Table 6.8 Prominent mediating tools

In the following two sections of this chapter I examine the similarities between Nicola and David's experiences of using the tools mediating these four different activities. For example, all four activities used the TPC for data entry and both teachers experienced difficulties with the ergonomics of using the TPC. Similarly, all four activities used e-portal as the data entry and access portal, which due to suffering from connectivity challenges, hampered Nicola and David's attempts at attaining the object of their activity.

Hardware

The most high visibility piece of hardware at Brampton High was the TPC. This machine was available for use in every classroom, and had a central mediating role in many of the students' activities. Images of the TPC were also prominently placed in various school documents and on the school's website. The TPC was positioned by the leadership team as the symbol for the model of education on offer at Brampton High.

The TPC was also prevalent in mediating many of the Nicola and David's activities with the machine's transportability and connectivity particularly crucial. The demands on both teachers through moving from site to site whilst needing connectivity to the school's intranet required a tool that could sustain this movement without having to reboot. One of the criteria set by the school's SLT for purchasing the TPC was its suitability in moving from location to location. The TPC manufacturer (Toshiba) identified their product as ideal for quickly and efficiently reconnecting to the Internet and intranet as soon as the machine was within the school's wireless cloud. The TPC proved to be rugged and reliable despite the demands of the machine being placed into bags and not treated particularly gently. Nicola and David were originally

issued with padded 'laptop bags' which were designed specifically to protect the TPC. However, all Brampton's teachers were advised by SLT not to use these as they identified the user as carrying a laptop which presented issues of personal safety, particularly for staff walking from one site to another.

In addition to transportability and connectivity, the philosophy underpinning the procurement of the TPC over conventional laptops was that the tablet mode and OneNote program could mediate students' accessing a range of learning opportunities specifically afforded by these tools. Teachers used the same model of machine as students to keep procurement costs down and to ensure compatibility. However, a number of the machine's applications proved to be detrimental to its performance - the physical size of the TPC which, whilst smaller than a conventional laptop, proved to be heavy and unwieldy for some of the smaller students (see also Selwyn, 2010b, p. 4). Moreover, the ergonomics of using the TPC for handwriting when in tablet mode did not mirror those of using a piece of paper. The TPC had a thickness of 40cm, which required smaller students (who were also frequently younger students) to hold their hand above the TPC so that the tablet pen was in the correct position for writing on the EVD. This had implications for students' handwriting, as some of the school's students found handwriting a challenging activity made all the more so by the ergonomics of writing on the TPC.

As with the physical bulk of the TPC, for smaller students the machine's weight (approximately 2kg) also proved to be too much. For example, I observed a lesson in the Science faculty where YR 7 students working in pairs were given a task which required the use of data logging equipment. The activity required one student to use their TPC for data generation via the logging equipment, whilst the other students would make notes and observations using OneNote software and the tablet function of the TPC. The students could not physically hold the TPC long enough, due to its weight, to complete the experiment. The student using the data logger had to precariously balance her TPC on the edge of a chair, whilst her partner resorted to making notes in her textbook which she later word-processed.

The SLTs decision to procure TPCs was also driven by the object of allocating students their own personal machine which they would be able to take home with them. As I discussed in Chapter 3, Brampton High serves an area with high socio-economic deprivation. Through surveying parents, the school's SLT identified a digital divide (see Chapter 2) characterised by a low level of access to the Internet and computer hardware in a significant number of students' homes. The TPC was a means of addressing this divide by giving students access to a machine which had easy Internet connectivity through logging onto wireless clouds, for example, in council buildings such as the Hither Vale Library. The outcome of issuing the students with TPCs was that, even if they could not access Broadband Internet at home, they had a machine which could be easily connected to the Internet in a number of locations close to their home.

However, lending students machines proved impossible. There were major concerns raised by teachers and parents about the safety of students who could easily be identified through the school uniform as belonging to a school which loaned laptops. Parents were worried about the likelihood of their children being 'mugged' for their TPC. There were also difficulties in encouraging parents to assume liability for the machine when in their children's possession. Moreover, the promised wireless clouds had numerous connectivity problems with the TPCs. After a short pilot period the lending of TPCs to students was abandoned.

This context is important as it gives some of the history about why TPCs were procured as the machines used in the school. TPCs were thought by the school's SLT (who based their opinion on the recommendations of a major hardware manufacturer) to be the tool most appropriate to the demands of Brampton High. However, not only did the TPC not prove to be the most suitable machine for the students - it was also not the most suitable for the staff. The small screen size proved too big for the smaller students, and proved too small for the adult teachers. Common to both Nicola and David's experiences were the numerous instances of incorrect data entry stemming from the ease of making such a mistake with the TPC pen. Moreover, touching the EVD accidentally resulted in the TPC mediating the completion of unexpected tasks, for example, moving the cursor to a different part of screen. To overcome the difficulties of data entry, both teachers bought their own 'mouse' peripheral, to reduce

instances of incorrect data entry, and USB data storage devices onto which they 'backed up' data.

The demands of teaching in the sometimes challenging environment of Brampton High required a computer which was both physically resilient but also easy to use. Both Nicola and David infrequently used either the tablet mode or EVD function of the TPC. Indeed, other than wireless connectivity, the specific applications of the TPC appeared to make teachers' activities more difficult to complete. When these TPC difficulties faced by the key informants are considered in conjunction with the difficulties faced by students using the machines, the appropriateness of such a machine in this setting is questionable. What the manufacturers positioned as a machine ideal in mediating the aims and objectives of the school was anything but (it is important to note that the machines procured by Brampton High were supplied directly from Toshiba UK).

Hardware manufacturers have an obvious vested interested to promote the most recent version of school compliant technologies (see for example Selwyn, 2010b, p. 71). Selwyn's comments appear to reflect exactly the situation at Brampton High. Here was a 'new' school being built as part of the then Government's commitment toward state education which invested large amounts of money (see Chapter 3) into technology such as the TPC. It seems that the promises of hardware and software manufacturers for their products were, in actuality, a promotion exercise for their electronic wares – an exercise which resulted in Brampton High making a large capital outlay on TPC technology.

Like the TPC, the school's LCDPs were also highly visible in each room (the LCDP and IWB had a physically large presence in each room, which I discussed in Chapter 4). The LCDP was suspended from the ceiling of each room via a grey tube which both bolted the machine in place and also acted as a conduit for the various cables which connected the LCDP to the IWB and TPC. The LCDP was linked to an amplifier and speakers, so that audio could be heard, and was operated via a remote control. At every teacher's desk (positioned in the 'traditional' position at the front of the class) a D Subminature (Dsub) cable plugged into the back of the TPC to connect the computer to the LCDP. Originally this was supposed to be a wireless

connection - however networking problems rendered this form of connection as unreliable, and although still in operation, was not used by either of the key informants.

The LCDP presented Nicola and David with challenges similar to those created by the TPC mediated applications. The LCDP Dsub cable positioned in the teachers' desk forced these teachers to follow a traditional room arrangement; otherwise they could not use the LCDP. The original notion of teachers being able to move around the room whilst wirelessly transmitting from their TPC to LCDP proved to be impractical. As can be seen in Image 6.1 the Dsub position in Nicola's teaching room mediated her to be at the front of the class and in doing so reinforced traditional power relations – which she was uncomfortable with - in the classroom.

Image 6.1 Typical teacher's desk arrangement with Dsub connectors circled

Selwyn (2010b p. 4) describes a school which had to procure sets of steps to aid students (smaller than most teachers) to reach where the IWB had been positioned in the room. The situation in the school Selwyn describes - whilst different from the challenges teachers and students faced at Brampton - reflects distinct similarities in the technology mediating Nicola and David's tasks. As I discussed in Chapter 2, when asking my "what it is like to use technology" research question, I focussed on the relationship between technology and pedagogy. The positioning of the Dsub connector at the front of the classroom mediated a

Nicola to employ a particular teaching style – a style with which Nicola had fundamental concerns.

Indeed, one of the criticisms raised by both key informants regarding the use of the LCDP in MAM was this enforced 'standing at the front' to make their presentations. The manufacturers of the LCDP promoted their product as being equipped with wireless connectivity. In practice, the wireless connectivity constantly crashed. The NS team identified this as resulting from the sheer number of wireless signals from the TPCs and LCDPs in every classroom. The manufacturers were however, aware of how many products they were supplying to the school and yet did not suggest this might pose wireless connectivity problems. The NS team addressed the problems of connecting the TPC to the LCDP with the Dsub connector.

Both Nicola and David bought their own 'Presentation Pilots', which remotely controlled PowerPoint presentations via the LCDP. Both teachers chose to buy their own remote control devices as although the LCDPs had been supplied with remote controls when first installed, these devices had been lost, broken, vandalised or stolen. Consequently, Nicola and David bought their own peripherals so that they were not restricted to where they had to sit or stand in the classroom. Connecting the Presentation Pilot receiver to a USB port in the TPC mediated the control of PowerPoint presentations from any part of the room. The key informants connected their TPC to the Dsub at the front of the class, but were able to move around the classroom whilst controlling the presentation.

The positioning of the Dsub connector had implications for both teachers' pedagogy, and yet these implications appeared not to have been considered. From interviewing NS team members, it transpired that it was the head of the NS team who was responsible for deciding the location of the Dsub. Because of the modular layouts of the classrooms, the Dsub could have been easily positioned anywhere in the room. However, the NS team leader thought the Dsub should be at the front so that teachers could 'control the kids from the front of the class'. What is relevant here, is that a consequence of technology that mediated teachers to be at the front of the class (when using the LCDP) was not based on the school's educational philosophy or educational technology research - teachers had to present from the front of the class

(unless they bought their own peripheral) because that was where the head of the NS team thought that teachers should stand.

Software

The TPCs used the Microsoft Windows Vista operating system. With the release of Vista in 2007 the school provided teachers with a new model of TPC which had Vista pre-installed as the operating system (the students' machines were upgraded to Vista between 2007 and 2008). Both Nicola and David indicated that Vista had advantages over the Windows XP operating system it replaced. In relation to the four activities analysed here, Vista did not appear to have any detrimental effects on the key informants' abilities to attain their objects.

The use of ROF for data storage was however problematic. The primary difficulty both teachers highlighted was confusion stemming from the 'locked for editing' dialogue box message which was displayed when they attempted to enter data into a ROF. Although Nicola and David only rarely made this mistake, there were frequent occasions when they had to support colleagues who had. For example, after the 'locked for editing' message was displayed, the user was then asked if they wanted to 'revert back to the original file' or 'create a copy' with the dialogue box prompting an 'OK' button. There was no capability to answer one of the questions individually as there was only a single OK button. Consequently, users did not know to which action they were indicating OK.

After I spoke to the head of the NS team, she told me that the OK command resulted in a copy file being created which had the file name, for example MAM data copy.doc. However, for Nicola and David, the closeness of this file name to the original file name (MAM data.doc) led to confusion. Indeed, teachers thought that they had copied their data to the original file, which was not the case, and resulted in data being saved only as a copy file not as the original. Consequently, in the activities where ROF was used there were a number of occasions where the key informants either had to inform colleagues of data which had not been entered to a ROF, or act as 'peacemakers' between irate colleagues who had come into conflict over incorrectly entered data into ROF. Unlike the Vista operating system, the use of ROF software

appeared to prevent Nicola and David from attaining the object of their activities and occasionally caused conflicts between them and their colleagues.

Internet-intranet-portal systems

The Internet-intranet-portal systems mediating the four activities were primarily related to the school's Learning Gateway and e-portal. The Learning Gateway afforded Nicola and David access to any of the school's databases - CMIS was the system which co-ordinated this integration of data sources, and e-portal the means of accessing this data, with the system's 'frontend' being the Learning Gateway. These teachers increasingly relied on the Learning Gateway in mediating access to e-portal, and consequently, their activities were therefore susceptible to the difficulties the system faced. Most prominent amongst these was the fragility of accessing e-portal via the Learning Gateway because of intranet failure.

The Learning Gateway mediated Nicola and David access to e-portal via their password protected 'staff' tab. The Learning Gateway could be accessed from computers physically within the school or by means of the school's Internet web page. However, considerable difficulties were evident when e-portal crashed due to the school's intranet being compromised. In such cases, the e-portal page which was being viewed 'froze' and then crashed, leaving an intranet error message. This had major implications on the occasions when e-portal was 'down', and resulted in both teachers being unable to access a raft of important documents. For example, e-portal was the means of registering students. As I discussed in Chapter 5, the SAA system relied on e-portal as there was no dedicated tutorial period and student attendance was registered within the first curriculum lesson of the day. Inaccessibility to e-portal had the consequence of Nicola and David not only being prevented from entering attendance data, but from also accessing it. In short, when e-portal crashed no one in the school knew which students were at that moment present or absent.

From interviewing the manager of the school's NS team I was told that e-portal crashed between 10 and 15 times per year. These events mostly happened after school closures for holidays or after weekends, with the average 'down' time about 30 minutes. Unfortunately, over 90% of these e-portal crashes happened first thing in the morning when the school's

statutory attendance registers needed to be completed. The NS team manager told me that the reason behind this vulnerability to e-portal crashing was that, although automatic diagnostic checks were completed over school shut down periods, these only identified problems. There was no automated system for addressing the problems which were identified.

The prominence of the Learning Gateway and e-portal in almost every aspect of the key informants' activities rendered the reliability of these systems as vital to these teachers. Both teachers had reservations regarding the complete reliance on e-portal for attendance data. Despite its central role, both Nicola and David positioned the Learning Gateway and e-portal as much symbols of the modernity of the school as much as they were tools - computer hardware and software were purchased as much as:

> …symbolic political gestures, as they were attempts to actually acquire the right tool to get a job well done. (Cuban, 2001. p. 158)

The positioning of technology as a symbolic gesture resonated with the concerns of both Nicola and David regarding the centrality of the school's Internet-intranet-portal systems. Both teachers expressed concern that e-portal had to be as close to 100% reliable as possible but this was not the case. Indeed, the concerns these teachers expressed regarding e-portal reliability were manifest in what they called the 'dread' of returning to work after a holiday or weekend to find e-portal inoperative and the school in disarray. Due to the relative frequency of e-portal crashing, the school's SLT drafted a contingency plan for taking attendance registers – teachers were asked to write down on a piece of paper who was in their class, which was later entered onto e-portal by members of the support team.

Identifying contradictions

In this section I identify similarities between the four contradictions I identified which prevented both Nicola and David from attaining their objects. The tensions which manifest as contradictions in the four activities have common features which link technology, working practices and both teachers' professional identities. For example, the use of ROF signified an 'us and them' culture which was similarly reflected in the increasingly outcome driven focus of PMR. The technology mediating these contradictions can be seen in tensions between what the tools mediating these activities (supported by rules and the division of labour) established as

Nicola and David's working practices, and how technology challenged their experiences, values and beliefs.

The effect of technology on the key informants' working practices could be seen in the tensions, between the expectations allied to a mediating technology (such as the use of social media) and the actual use of that technology. Similarly, technology mediated a reorientation of the PMR activity from what both teachers described as 'supportive' to one which appeared 'judgemental'. The prominence of data, and the centrality of technology in mediating the analysing and presenting of data, resulted in tensions between teachers, managers and the object of different activities. This is an important point, as I am identifying technology as not mediating but preventing the attainment of an object (see Yammagata-Lynch, 2010, pp. 107-108 for similar object contradictions).

For example, RTR mediated parents' access to the Learning Gateway and with it information relating to attendance, punctuality and academic performance. However, because of technical difficulties, which led to inaccurate data entry, RTR actually *diminished* parent and school communication as parents were accessing inaccurate data. This resulted in tensions between teachers and parents, and between teachers and some of their colleagues. RTR was reliant on a complex system of interdependent components. The technological complexity did not support Nicola and David in their already time constrained activities. Indeed, both teachers found that the process of having to check data entries resulted in them having less time for other activities.

In PMR, technology was intended to mediate the process more to become more efficient, easier to use and having a greater impact on student attainment and teacher effectiveness. However, the technical difficulties associated with the system increased what was, for these teachers, already a stressful process. Whilst the use of DDLs might at first appear to be the most contradictory part of PMR, Nicola and David were pragmatic about their use as there was an opportunity to make a word processed entry to support the DDL statements. However, the untrustworthiness of the data entry system, allied to the frequent crashing of the system due to the demands of the data entry window, was more contradictory.

The assumptions inherent in the SLT's positioning of technology were also part of the tensions and conflicts experienced by Nicola and David. In all four activities, technological capability appeared to outweigh the social and cultural impact of those capabilities. The Learning Gateway and e-portal mediated the ability for 'virtual' tutor groups. All of the requirements of the SAA pastoral care model could be addressed electronically, and in doing so technological capability mediated the removal of the physical tutor group. However, the social effects of using technology in this way resulted in students potentially having no face-to-face contact pastoral care.

Activity	Contradiction overview
MAM	Tools - Subject Tension between the tools that mediate the activity and the subject of the activity. Teachers experience the use of ROF for data storage as indicating distrust. Moderation is built on a trust of professional opinion and consequently there is a tension in the system. This is compounded by the evolution of MAM into a process of comparison between teachers, and the imposed norm of presenting data via the LCDP.
RTR	Tools – Community Tension between teachers and colleagues arising from an over reliance on RTR system impacting on responsibilities. Tension between teachers and parents arising from inaccurate data resulting in incorrect information being communicated. Incongruence between the 'social' nature of SMS and the content of information sent.
PMR	Tools – Object Tension between tools used in PMR and the object of the activity. Tools increase the stress inherent in performance management process for some teachers. Complexity of system, and the role of tools in mediating the system reflected in the increasing importance of 'hard' data.
SAA	Subject – Object Tension between the object of a technology mediated virtual tutor system, and the values, rules and norms held by the subject – David Sharma – with regard to the pastoral care model at the school.

Table 6.9 Contradiction overview

In table 6.9, I present an overview of these contradictions. From examining these contradictions it appears that, although the four activities do not share common objects and are directed at different subjects with different outcomes, there are similarities in the conflicts

within these systems. For example, RTR relates to student performance through reporting, PMR to Nicola and David's performance. Only when examining the contradictions in these systems does the implicit linkage between teacher and pupil performance emerge in both systems. Prominent in these contradictions is the effect of technology in mediating the communities participating in these activities. The increased reliance on technology has expanded these communities from what might be called the 'traditional' model of school communities. There are those community members who are physically within the school, such as teachers, pupils, SLT, LST, SA and LSA, and those outside the school, such as parents, Police, Social Services, GPs and the LEA.

What this identification of communities has highlighted are two forms of community. First, those communities defined by the activities teachers participate in, and second the communities the key informants themselves define and identify with. For example, David is a member of the school's SLT; he is also a member of the Science Faculty, teaching faculty, and various school social groups. Nicola is a member of a union and she is a representative of that union. Both teachers identify themselves as part of multiple communities. The relationships between these communities of self-identification, and the communities of activity participation, appear to have been mediated by the prominent role of technology in these communities. Both Nicola and David experienced tensions between their self-identified communities and the transient and imposed communities of the RTR and PMR. This tension was particularly so, if these teachers experienced their membership of one community being detrimental to their membership of another - community was not a single concept as both teachers were participants in multiple simultaneous communities.

I am wary of trying to overly-reduce the complex interrelationships between technology and the contradictions in these four activities. However, several similarities do appear to be common to both key informants' experiences of the conflicts in these activities. All four activities have objects of teacher performance, which are not shared by Nicola and David. There are tensions between self-identified communities and imposed communities. All four systems rely on technology for evidencing practice to such an extent that this evidencing itself becomes the object.

Systems overview

The similarities between how technology mediated Nicola and David's activities has revealed how technology has also mediated changes to these activities. In Table 6.10, I have given a generalised model of educational technology mediation on the different components of these teachers' activity systems. The information in this table represents a synthesis of my activity systems analysis of both key informants' data (I have not included the subject component of activity systems in the table as the subjects remained the same – Nicola and David).

Components of activity system	Generalised model of educational technology mediation
Object	Technology can mediate the redefinition as much as attainment of objects Changes to object can mediate conflicts between subject and object
Rules	Technology can mediate 'traditional' pedagogical rules Technology can mediate conditions which challenge personally held rules Technology can be positioned as a rule
Community	Technology can mediate tensions between community members Technology can mediate conditions which render communities remote and intangible
Division of labour	Technology can mediate increases in teachers' workload and stress Technology can mediate and reinforce vertical divisions of labour through power relationships

Table 6.10 Generalised model of educational technology mediation

Technology and object

The first of the components I examine here is how technology mediates the objects of activities. The object of an activity is its goal or motive and defines the 'prospective outcomes that motivate and direct activities' (Kaptelinin & Nardi 2006, p. 66). These definitions of object are important to consider, particularly as technology mediated changes in the objects of both key informants' activities. Technology was as likely to mediate a redefinition of the object of an activity, as to mediate the attainment of that object in its original manifestation. Nicola and David's use of technology such as e-portal, TPC and LCDP, was as likely to prevent them from attaining the object of their activity as to mediate conditions where they would attain it.

Both teachers saw technologies such as ROF, text, and the TPC as potentially capable of redefining an activity. For example, the use of ROF for data storage mediated an emotional response for the key informants. However, ROF also mediated corrections to errors in data entry which required a long and labour intensive correction procedure. What might be seen as a small technological change to data storage protocols had wide reaching, and unexpected, consequences.

The effect of what might be a 'small' technology on wider parts of an organisation suggests:

> …that technology is neither additive nor subtractive. It is ecological. (Postman, 1992, p. 18)

In this ecological model, a seemingly minor change to a system, like the addition of a new species to a biological ecology, can result in a complete change to that ecology. The ecology metaphor transfers to technology mediating the object of an activity (for further work on 'information ecologies' see Nardi & O'Day, 1999). The introduction of new technology into an ecology is systemic with change felt throughout the entire system (Nardi & O'Day, 1999, p. 51). This constant technologically mediated change is refelcted in the changes to the object of an activity which is not necessarily a fixed nor stable, as the process of activity adapts the object of that activity (Kuutti, 1996, p. 35). Moreover, all the subjects participating in an activity do not necessarily share the same object (Kaptelinin, 1996, p. 110).

Object also relates to why is an activity occuring (Mwanza, 2002, p. 128). Exploring how objects can be changed by the activity - that all those participating in an activity do not necessarily share objects - and that the object of an activity is concerned with why the activity is taking place, clarifies some of the tensions Nicola and David experienced between technology and their objects. Involvement in an activity may change the key informants' relationship to the object of the activity (Gay & Hembrooke, 2004 p. 13). For both teachers, introducing technology into an activity, or for that matter introducing a new application for an existing technology, altered the activity *and* object.

The use of e-portal in mediating the SAA system is a prime example of Mwanza's (2002) definition of object. The technological capability of e-portal mediated a change in the model of pastoral care at the school and also changed the object of pastoral care for both key

informants. Before e-portal and SAA, pastoral care had the object of supporting vulnerable students who might be facing a number of emotional, financial, social or physical challenges (these challenges might in some way impact on the academic attainment of a particular student and, as such, pastoral care always had an object of improving academic attainment). However with e-portal, SAA redefined pastoral care so that pastoral concerns were a subset of academic performance.

Without e-portal there could be no SAA system, as the school would have needed some form of attendance registration period so that students' attendance could be monitored. However, e-portal mediated the removal of such an activity through using curriculum attendance data to indicate the levels of attendance. The object of SAA (to support 'virtual' tutor groups which increased the efficiency of pastoral care whilst increasing examination attainment) mediated changes to the model of pastoral care at the school. The suggestion of authors such as Kuutti (1996), Kaptelinin (1996) and Gay & Hembrooke (2004) that the object of an activity can be changed through participation in that activity is reflected in technology mediating a redefining of the SAA object, which changed both teachers' relationships with the school's model of pastoral care.

The Learning Gateway and e-portal had both been in operation for several years before the SAA activity was introduced. During this initial time period, e-portal mediated the existing model of pastoral care by simply removing the need for paper-based attendance registers whilst simultaneously giving teachers access to data collated through CMIS. The technology of the school's intranet mediated the linking of attendance data (via CMIS) to all the other data sets in the school. Moreover, this linking was carried out in 'real-time', thus mediating the most up-to-the-minute, data supported, 'snapshot' for every student the school had ever been able to provide. The evolution of e-portal technology from mediating the existing pastoral care model, to redefining that model also redefined the object of the activity.

As much as large technological change, such as the Learning Gateway and e-portal, mediated Nicola and David's objects, there was also potentially as large a change mediated by ostensibly small technological change. These teachers both experienced technology as not just mediating

their objects but also redefining them. Both teachers' experiences of technology suggest that technological mediation was not necessarily restricted to the immediate context in which that technology was used – technological mediation in one location could, as Postman (192, p. 18) indicates, lead to a completely 'new environment' throughout an entire organisation.

Technology and rules

The second component I explored is the effect of technology on rules - rules are the formal and informal regulations that affect how an activity takes place (Engeström, 1987b, p. 78). However, when examining how technology mediates rules it appears that there are at least two different types of rules present in an activity. First there is the Engeström model which defines rules as those norms which support the activity itself. Rules can be those norms stating that data is stored in a ROF format, or that there is a specific time window for an activity to be completed, or that a specific technology has to be used to mediate an activity. However, rules as also those held by the participant themselves:

> The rules that guided the subject…were *self-generated goals* [my emphasis] and daily teaching responsibilities. The self-generated goals pertained to the aspirations that teacher had for how they wanted to use technology. (Yammagata-Lynch, 2010, p. 98)

These self-generated rules were evident in both key informants' interaction with technology. For example, the use of the LCDP to mediate MAM was a rule for that activity. However, for both Nicola and David this technology mediated a change in what they considered to be the informal rules of the activity of moderation. For these teachers, moderation was a collective and supportive process where professional opinion was valued and acted on. In the experience of the key informants, the LCDP rule turned the meeting into a corporate presentation, where the data mediated via the LCDP was scrutinised by the faculty management.

As with technology mediating the object of an activity, such mediation potentially had an effect on what might be historical rules. The TPC re-orientated some of what the key informants considered to be long standing and informal rules at the school. For example, the data entry window (mediated by CMIS, e-portal and the TPC) for SAA, and RTR, attendance data changed what the key informants held as their personal rules about how they would take the attendance register. When Nicola and David were teaching the first lesson of the day (8.30-

9.20) they were aware that the data they entered onto e-portal would become 'live' and accessible to their colleagues and to parents on the Learning Gateway. The rules integral to the technology these teachers used (that e-portal data had to be updated onto CMIS within a time window in the first period) had major implications for what they did in their classrooms.

An example of these implications could be seen in the rules which supported the use of the LCDP. As I discussed earlier in this chapter, the remote controls for the LCDPs were missing from the majority of classrooms. Although Nicola and David had bought their own remote control device, this only allowed them to manipulate slides in PowerPoint. Consequently, there were no means for these teachers to access the 'freeze' function on the LCDP (the freeze function kept the current PowerPoint slide projected via the LCDP, while Nicola and David could access different applications). The advantage of this was that the students were able to view the slide being projected whilst teachers could complete another activity on the TPC unseen by the audience.

This meant that to complete e-portal registration the TPC had to be disengaged from the LCDP otherwise the e-portal register – along with potentially sensitive attendance information – would be displayed to the class. Consequently, when completing period 1 registers, both Nicola and David had to factor in a 'down time' in the early stages of the lesson where the LCDP could not be used. The rules of the SAA system, along with the rules imposed by technological constraints, resulted in both teachers having to spend time planning an alternative activity in which the students could engage during the period that the e-portal register was being completed. This situation was only a problem for period 1 - for all other periods the e-portal register could be taken during a natural break in the use of the LCDP, and thus did not impact directly on Nicola and David's employment of the projector. In SAA, the rules of e-portal mediated a reorientation of the structure of these teachers pedagogy.

Both Nicola and David indicated that technology not only failed to transform their activities, but also reinforced what could be called 'traditional' pedagogies:

> …most teachers who adopt technologies…tailor the use of these machines to fit the familiar practices of teacher-centred instruction. (Cuban, 2001, p. 97)

Although technology might mediate conditions which support existing pedagogies through teachers tailoring these technologies to fit their existing practice, Cuban appears to miss an underlying issue. Having to locate the TPC in a position of power – at the teachers' desk at the front of the classroom – suggests that the rules inherent in the technology itself support Cuban's 'familiar practices'.

Technology comes with its own rules, some relating to hardware, software and systems. The identification of the rules embedded in technology relates back to my discussion in Chapter 3 of technological determinism, the 'politics of technology' (Winner, 1999, p. 28) and its 'non-neutrality' (Furr, *et al*., 2005, p. 277). The non-neutrality of technology is reflected in the ways in which technology can mediate 'specific forms of power and authority' (Winner, 1999, p. 28). Both Nicola and David attempted to subvert the technological rules which supported an imposed model of power and authority by using their own peripherals to control the LCDP.

Consequently, the rules which supported the use of technology in mediating an activity, or which emerged from the constraints of using technology, did not necessarily align with Nicola and David's self-generated goals. Rules can be individual expectations and that there can be a conflict between those rules located in individual expectations and those rules which reflect the expectations of the organisation. Thus, the individual expectations the key informants had as to what might be the mediating role of technology in an activity was the basis for conflict between the imposed rules of an activity, and their individual conceptualisations of technology in that activity.

However, despite the prominence of rules in activity systems, the rules which support different practices and activities are not 'set in stone', nor do they necessarily determine the activities in which teachers participate:

> I do not want to deny the meaning of laws and rules in our lives. But our activity is not determined by them. (Eskola, 1999, p. 111)

Nicola and David experienced tensions between organisational and technological rules on one hand, and the rules located in their individual expectations of technology on the other. Even though technology redefined some of the formal and informal rules at the school, this did not mean that these teachers held these rules to be their own. Indeed, the opposite appeared to

be the case; where the use of technology had actively redefined rules, both teachers attempted their own redefinition - the 'leeway' (Selwyn, 2010b, p. 145) - of the rules which supported technology.

Despite Nicola and David's attempts to redefine what they saw as technological rules, technology was itself positioned as a rule by the school's SLT, with the assumption that use of technology would be inevitably beneficial:

> Techno-promoters across the board assumed that the increased availability in the classroom would lead to increased use. Increased use, they further assumed, would then lead to efficient teaching and better learning which, in turn, would yield able graduates who can compete in the workplace. (Cuban, 2001, p. 18)

Both Nicola and David indicated that there was an (albeit informal) overarching rule that technology should be used as frequently as possible. This moral commitment to using technology - based perhaps on guilt stemming from the apparent waste of expensive technologies sitting idle – was important for Nicola and David. Both teachers felt that the manufactures of hardware and software positioned these tools as flexible and transferable; they could be used all day, every day, for a range of different activities. This possibility for constant use of technology was part of 'the computer industry's heavily financed promotions' (Bowers, 2000, p. 111). The materials provided by technology manufacturers – and the assumptions of techno-promoters – placed technology as:

> …the hallmark of progress and are thus the cornerstone of the educational process… (Bowers, 2000, p. 112)

However, Nicola and David's experiences did not reflect the manufacturers' promises. For these teachers not only did technology not necessarily mediate what it was bought to mediate, its introduction could be detrimental to successful systems, rules and process already in place. For the Nicola and David technology was not fundamental to their practice. Indeed the opposite was the case, the effect of technology was not a simple case of teaching with or without technology. For these teachers, the implicitness of technology being positioned as integral to their activities was an underpinning rule which appeared to supersede their own professional opinions.

Technology and community

The third component is community, with technology mediating Nicola and David's membership of communities involved in an activity. Community is the 'social group the subject belongs to while engaged in an activity' (Yammagata-Lynch, 2010, p. 2). Central in relation to technology and community is how technology mediates the relationships between the social groups of which teachers are members. For Nicola and David, technology appeared to have a sometimes detrimental effect on these communities.

The Learning Gateway and e-portal were examples of how technology meditated such communities. Firstly, e-portal extended the community involved in the activity of pastoral care from the tutor, Year Learning Leader (YLL) and specific members of the various support teams at the school (SEN, EAL) to potentially every staff member who could access e-portal. In Chapter 5, I discussed how SAA was a part of the school's approach to ECM and, as such, this extension of the pastoral community was an object of the SAA activity. However, the model of e-portal applications used in SAA reduced Nicola and David's ownership of pastoral responsibilities. The technology mediating the extension of the SAA community reduced both teachers individual responsibility.

Nicola and David had to re-impose their membership of the SAA community. For example, because of e–portal mediating SAA, new members of the SAA community relied on e-portal data for information regarding students. Indeed this was the object of the SAA system. However, for teachers new to the school, e-portal appeared to be the only means of accessing pastoral data. The SAA community was potentially so large (including both members within the school and from outside agencies) that there was a disconnection between these members of the community. Both key informants attempted to address this by actively introducing themselves to new members of the SAA community so that there was a sense of a physical world community as much as a virtual-world community.

Activities have an object common to a community (Kaptelinin & Nardi, 2006, p. 99). This is a different view of community from that which suggests that community is made up of the social group participating in an activity (Yammagata-Lynch, 2010, p. 2). The key informants in this

study might have participated in an activity such as SAA but they did not necessarily share the same object as each other, or other members of the SAA community. This distinction between definitions of community is important here as the conflicts Nicola and David experienced between technology and community were in part concerned with who was included in their communities, and the object these members were trying to attain.

For both teachers, the positioning of activities in the virtual-world rendered the communities participating in these activities as different from those in the physical-world. The social relationships between electronic-media community members 'differ in substantial ways' (Kling, 1996b, p. 428) from non-electronic communities. Whilst it could be argued that all communities are substantially different from one another, positioning a community within a technology mediated environment (such as the SAA community) renders the relationships within that community different from the same community being located in the physical-world.

The differences between physical-world and virtual-world communities are reflected in Nicola and David's experiences of e-portal. For example, these teachers were not always aware that they had become part of the SAA community. The data that they had entered onto e-portal regarding attendance might have proved to be pivotal in understanding when and *why* a student was truanting school. However, although they had become members of this specific part of the SAA community, Nicola and David were not necessarily aware that this was the case. Technology also mediated tensions between community members. Earlier in this chapter I discussed how the RTR activity which was mediated by the Learning Gateway, e-portal and text messages resulted in conflicts between community members because of inaccurate data entry. There was a link between the difficulties with data entry interface on the TPC, the resulting inaccurate data entries, and conflicts between members of the RTR community. Technology such as the Learning Gateway extended the RTR community to include parents. Consequently, the conflicts between RTR community members were not confined to the school's staff.

Including parents within the RTR community was one of the objects of the activity. However, the difficulties with the integrity of RTR data led to both Nicola and David having to access e-

portal to check the data which parents had accessed. Even when these teachers identified an error, because RTR data was ROF (see Chapter 4) there was a lengthy process which had to be completed before amendments could be made. Constant throughout the time period which elapsed between the identification and amendment of inaccurate data, was parents' ability to access RTR through e-portal. Both Nicola and David identified that the technological capability to offer parents' RTR placed specific demands on hardware, software and Internet-intranet-portal systems. The object of the technology mediating RTR was to extend the school's community to include parents. However, with the school's extension of the RTR community also came a responsibility that technology, such as e-portal, had to be mediate accurate communication by employing accurate data.

Technology and divisions of labour

Like the previous three components, the key informants divisions of labour were also mediated by technology. The division of labour is how tasks are shared amongst members of the community (Engeström, 1987b, p. 78) and part of:

> …distinguishing between collective activity and individual action. (Engeström & Miettinen, 1999, p. 4)

The division of labour is the link between individual and community - when considering the technological mediation of the divisions of Nicola and David's labour it is important to acknowledge the 'enormous complexity of the division of labour' (Tolman, 1999, p. 72).

The philosophy underpinning activity theory is developed from a process of 'reconstructing the emergence of the division of labour' (Engeström & Miettinen, 1999, p. 4) and the relationships between the use value and exchange value of commodities. This notion of commodity relates to my discussion earlier in this chapter regarding the meditational effect of technology on the commodification of knowledge and social relationships (Bowers, 2000, p. 74). The relationships between commodities' use value and exchange value are central to the complexity relating to the division of labour. Discussing divisions of labour is not simply a case of examining the time different subjects spend on an activity. Rather, divisions of labour reveal the relationship between tools, activities, objects and outcomes.

There were two main similarities in Nicola and David's data regarding technology and the division of labour. First, technology mediated increases to their workload. Second, technology mediated vertical divisions of labour through power relationships. With regard to the first of these similarities, Bowers (2000, p. 7) discusses how the efficiency of computer production challenges traditional values of craft, individuality and knowledge, as well as reducing the number of people involved in an activity. For the key informants, the increased number of technological tools reduced the time these teachers spent on activities, but increased the number of activities in which they had to participate. The upshot was that they had *less* time in which to complete their activities.

The increasing complexity of these activities resulted in the demands required of Nicola and David becoming progressively more challenging. Both teachers chose to purchase their own peripherals to address data entry issues, and to make the task of data entry less error prone and therefore less time consuming. However, with the increased demands of activities requiring data entry, the key informants found that they were still required to teach the same number of lessons. Consequently, despite the increased availability and number of technologies mediating their activities, these teachers found the division of labour being distributed more toward them, than was previously the case – they had more activities to complete.

The second similarity shared by Nicola and David was the vertical divisions of labour mediated by technology and which reflected differing power relationships:

> …can run horizontally as tasks are spread across members of the community with equal status, and vertically as tasks are distributed up and down divisions of power. *(*Barab*, et al.*, 2002, p. 79)

The increased divisions of labour experienced by the key informants reflected a vertical redistribution of tasks. With data analysis becoming an increasingly central part of both teachers' activities, so too was there a redistribution of labour. For example, prior to the CMIS collation of e-portal data, school wide data analysis was the specific remit of two members of the SLT. These managers had access to data analysis software which mediated comparisons of different data sets. However, the data they accessed was faculty wide rather than that of

individual teachers. With CMIS, the comparison of data was school wide, between individual teachers and 'real-time'.

For Nicola and David, this had the result of focussing more of their time on the production of data. Moreover, these teachers completed their own audit of data before entering this onto e-portal. With the focus at the school increasingly data driven, these teachers progressively spent more of their time concerned with data. The division of labour then was redistributed from members of SLT, and to lesser extent Faculty leaders, to individual teachers. Both teachers talked of the increased stress and isolation they experienced because of these technologically mediated divisions of labour. Both teachers' activities of data entry and analysis tended to be completed in isolation from colleagues. Although teachers might be sharing a physical space, such as a staff base, they were involved in activities which were individual to themselves. The divisions of labour resulted in Nicola and David becoming increasingly focussed on their own individual activities, mediated by technology such as the TPC and e-portal, rather than as members of physical-world communities – this had implications for the social and cultural fabric of the school. As Tolman (1999, p. 73) indicates, division of labour in human society '…are the most obvious indicator of the individual human's societal nature'.

Divisions of labour reflect the place of the individual within wider society. However for the key informants, the divisions of labour mediated by technology, whilst still positioning them as part of Brampton High's 'virtual' society, reduced the societal nature of their activities in physical-world society. The divisions of labour increased the number of activities in which both teachers in this study participated; increased the members of the virtual communities sharing the objects of those activities; and increased the stress and isolation Nicola and David experienced. All of these consequences were, at least in part, a result of divisions of power (Barab, *et al.,* 2002, p. 79) represented by vertical divisions of labour. For the key informants, technology reinforced these divisions of labour by mediating redistributed divisions of power where the school's management team had fewer tasks and individual teachers more.

The horizontal divisions of labour amongst those with equal status did not appear to be majorly redefined by technological mediation (this is not to say the divisions of labour

remained constant, as this was not the case). However, for Nicola and David, technology appeared to mediate the redistribution of an increased number of activities amongst different community members. In contrast, the vertical divisions of labour mediated by new technologies reinforced the power relationships between managers and teachers.

6.4 Summary of key themes chapter 6

In this chapter, I have integrated the analysis of the previous two chapters and presented petite generalisations. I have developed an 'overview' of my analysis of the key informants' experiences of technology and recognised similarities in these experiences.

In the first section, I established contextual generalisations which related to technology and trust, technology and control, technology and relationships, and technology and truth. I examined both teachers' contextual data and identified resonant features present in both data sets and developed a contextual overview. I have suggested, that there is a blind faith in technology; that scepticism of such technology is seen as an off-message activity; that technology is a tool mediating surveillance and control; that technology renders relationships formal, functionary and distant; and that truth is reflected through technology being the dominant discourse.

In the second section, I discussed generalisations relevant to Nicola and David's activity systems. From examining all four systems, I have been able to explore relationships between the different components of these systems – I have discussed the similarities in how technology affects both teachers' objects, the communities to which they belong, the rules which define their activities, and the divisions of labour which distribute tasks. I identified the tools Nicola and David used, and divided these into hardware, software and Internet/intranet/portal systems. I discussed in detail some of the implications of these tools. I examined technical consequences such as the difficulty of data entry; systemic consequences reflected in the redefining of the school's pastoral care model through e-portal; and cultural consequences such as the reduction in the number, and importance, of physical world relationships. I then identified similarities in the contradictions which prevented Nicola and David from attain their objects. I established a 'systems overview' – for example, that technology redefined as much as supported these teachers attempts to attain their objects; that technology reinforced 'traditional' pedagogical rules; that technology led to tension between community members; and that technology redefined divisions of labour, which increased Nicola and David's workload.

Chapter 7: Evaluations

Synopsis of Chapter 7

This concluding chapter has two strands - I evaluate the design and methods I discussed in Chapter 3, and consider the implications of my analysis of Chapters 4, 5 and 6.

First, I reflect on how this study sits in the field of education technology research and particularly the critical study of technology. The project is part of exploring and reviewing with a critical lens, some of the technologies mediating Nicola and David's activities - my evaluation of the study examines if this has been the case. I examine if my positioning of the study as sociocultural and critical has been borne out in practice. I consider some of the weaknesses of activity theory as my analytical framework and suggest how this project could be extended and developed.

Second, I present four localised findings as to why both Nicola Howard and David Sharma experienced educational technology as they did. It is not my intention that this chapter should be read as a pessimistic outlook on technology. However, there have been a number of different resonant phenomena which link technology to conflicts at Brampton High. These findings are my tentative understanding as to why Nicola and David's experiences of technology did not mirror the expectations of those promoting the techno-centric educational environment found at Brampton High.

I finish by suggesting a number of conclusions from the work, and focus on what might make educational technology at Brampton High better. I offer some suggestions as to how technology – which I reiterate is a powerful, empowering and emancipatory tool – can lead to a change in the structures of Brampton High's performative educational model. I discuss the need for moderation to acknowledge teachers' opinions as much as technologically mediated data; that communication needs to have a human as well as technological face; that performance management should reflect the unquantifiable as well as quantifiable; that technology can, and should, support both the pastoral and academic work of the school.

7.1 Evaluating the study

During the research, Nicola Harvey, David Sharma and the teachers and support staff of Brampton High have allowed me access to highly privileged data and accounts of their working lives which were often inspiring and moving. Consequently, foremost in the evaluation of this study is the acknowledgement of the time, effort and patience displayed by those who have participated in it. As Stanford (2001, p. 840) suggests:

> I found the real treasure in this study was the discovery of the group of remarkably strong, wise, positive, compassionate, and persevering teachers. How many others like them are in schools across the nation, battling "the plight of children and youth in our decaying cities," and doing so, unnoticed?

Like the teachers with which Stanford worked – and despite the 'trials and tribulations' of teaching in a challenging, inner-city UK state school - the staff of Brampton High demonstrated consistently a dedication and commitment to the school's students which was truly remarkable

The justification for this study was to critically examine two key informants' experiences of educational technology in their actives at Brampton High. I wanted to explore the complex relationships between what teachers do, and the meditational effect of technology on what they do. I believe that to an extent I have accomplished this – at least with regard to Nicola Harvey and David Sharma. Central to evaluating this study is examining the degree to which it has been a *critical* exploration of educational technology. In doing this, I have found reflecting on Selwyn's (2010a, 2010b) recent work particularly helpful. Selwyn sets out what might be called a programme for critical educational technology research, and highlights what he regards as some of the issues facing such research. I suggest that my examination of Nicola and David's experiences of educational technology in such a 'techno-centric' school as Brampton High has been academically critical and supports Selwyn's programme. Such a critical view on technology might help inform educational policy-makers, educational technology researchers, and any person who has an interest in computers, technology and teachers.

I have been wary of making unsubstantiated claims from this study, which after all only explores at the micro-scale a specific socio-economic-political setting. Consequently, and as I discussed in Chapter 6, I am not arguing for generalisability. However, I stand by my claims for presetting 'petite generalizations' (Stake, 1995, p. 7). The stories I have discussed are representative of the informants' views at the time of the data generation. I am acknowledging that these might well be different stories if I were to re-visit them today. However, there were a number of concepts, categories and relationships between activity system components, which were consistently present in both teachers' data. I suggest that this study has revealed the effect of technology on the deep-seated emotions and beliefs these teachers hold as to what, for them, being a teacher is about. I have offered an insight into understanding more about how technology mediates their activities.

When evaluating this study it is important to focus on the limits as much as achievements. Limits are the impact of 'theoretical and methodological sources' (Gates, 2000, p. 457) on research. In Chapter 3, I described how I saw this study as part of a sociocultural CHAT framework. There are limits in activity theory analysis (see for example Clapham, 2009a). Activity systems are interrelated with many other systems at any one time. The analysis could have been strengthened by increasing the magnification of the analytical lens through examining the relationships between systems such as that mediated by using a third generation model of activity theory analysis. Using such an analytical model, which explores the relationships between systems, as well as looking at the components of an individual system, might reveal a greater sensitivity in the analytical framework. Such sensitivity would expose not just an activity system which is in contradiction, but some of the context of the contradiction in terms of relationships between systems.

What I have experienced through using activity theory is its power in helping to explore complex relationships between technology, teachers and their activities. These relationships led to the identification and analysis of activity systems, and the contradictions rising from technology within these systems. When I reflect on my experiences of using activity theory, I have struggled to come to terms with some of the functional aspects of this analytical tool; for

example, the apparent confusion in the literature regarding the meaning of terms such as object. Although I am certainly not qualified to comment on issues of linguistics, these are issues that appear to reflect the ambiguity of the English language when compared to the Russian activity theory was originally written in (see Bakhurst, 2009, p. 208) rather than deep technical concerns.

However, these difficulties with translation are not the only challenges facing researchers using activity theory – this approach should not be considered as a completely unproblematic and coherent framework. For example, there are the challenges associated with the complexity of 'real-world context' (Yamagata-Lynch, 2007, p. 453) when using activity theory to explore qualitative data. As such, there have been a number of questions troubling me regarding activity theory analysis. Principle amongst these is that if human beings participate in multiple activities, some simultaneously, then 'subsuming them all under a single category' (Bakhurst, 2009, p. 198) and simply calling them an 'activity' appears incoherent. Allied to this, is the difficulty in resolving the complexities of identifying when one activity system begins and another ends; or delineating between a single activity with single objective, or multiple activities with multiple objectives. To address these challenges, in Chapter 3, I explored how my model of activity theory 'zoomed' in and out of the data. In other words, to consider the implications of a single activity system required both zooming in to the specifics of that system, what I would call the relationships between the components of that system, and zooming out to explore that system's connection within the surrounding context.

My experiences of using activity theory are that it is, as Bakhurst (2009, p. 197) suggests, a 'fertile' approach to educational technology research. These experiences have also led to the strengths and weaknesses of my model of activity theory analysis becoming relatively well defined. That activity theory mediates a detailed examination of technology in complex systems is its strength – the difficulties in knowing the boundaries of the context, and when to stop, are its weakness. I am not making radical claims for theoretical flaws in activity theory analysis, as this is misrepresentative. My evaluation of activity theory is in the 'reactivness' of the analysis – for the analysis to 'hold water' it is crucial to explore the meanings of relationships between components of an activity system (the subject, object, tools,

community, divisions of labour), as well as looking at the system as a whole entity, so as to reveal sensitivity in the analytical framework.

A development of my analysis would be to extend the informant sample and focus on one activity system, and how it interconnected with others, in greater detail. For example, exploring five teachers' experiences of technology mediating a single system (for instance RTR discussed in Chapter 4) and the relationships between the technologies mediating that system (tablet PCs, Learning Gateway, e-portal and SMS texting), and how that system interconnected with others at the school, would reveal a greater perspective as to the effects of technology on communities of teachers, students and parents. With a sample still small enough for it to be detailed, yet slightly larger to reveal a greater perspective of experiences, the nuances of the relationships between the components of the system and the similarities in these teachers' experiences of technology might be enhanced.

To conclude my evaluation of the study, qualitative research is as much about demonstrating to the reader why the researcher should be believed:

> If there is a 'gold standard' for qualitative research it should only be the standard for any good research, qualitative or quantitative, social or natural science. Namely, have the researchers demonstrate successfully why we should believe them? And does the research problem tackled have theoretical and/or practical significance? (Silverman, 1997, p. 25)

I believe that I have demonstrated a rigorous approach to this project based on trustworthiness and good faith. I am not positioning this project in terms of Silverman's 'gold standard'. However, I am suggesting that the case study ethnographic design, qualitative CHAT theoretical framework, and activity theory analysis, have supported my aims for this project. I also believe that the research questions I have posed have been directed toward issues of both practical and theoretical significance. The experiences of teachers who frequently use educational technology in their professional capacities are of significance. Exploring technology through a critical lens only strengthens this significance.

7.2 Evaluating the analysis

The motivation for this project came from my personal experience of working in schools with different philosophies toward technology in education. I found the ideas of authors such as Lyotard, Cuban, Postman, Bowers and Selwyn resonated with my personal experiences of technology. From engaging with examples of these authors work, I imagine I have begun to develop a critical lens through which to examine technology in schools. To utilise such a lens, and in order to answer (at least in part) my research questions, I wanted to experience as much as I could, technology as Nicola and David did. When I asked "what is it like for teachers to use educational technology", I wanted to experience what it was like for *me,* in an effort to understand more about what it was like for *them*. When I asked, "why do teachers use educational technology the way they do", I wanted to experience the tasks, the pressures and the expectations faced by these teachers. When I asked, "what are the consequences of using educational technology", I wanted to experience the emotional, philosophical, pedagogical and technical consequences.

Through asking these questions I have concluded that there is much to be learnt about how technology mediates Nicola and David's activities. Particularly, there is a pressing need to counter the portrayal of the inevitability of educational 'improvement' via technology and to respond to the technocentric and:

> …celebratory commentary about schools and digital technology that emanates from the mass of technologists, educationalists, social psychologists and pedagogy experts that constitute the academic educational technology community. (Selwyn, 2010b, p. ix)

Central to such a corrective is examining educational technology critically and deeply whilst challenging the implicit assumptions which surround technology. In Chapter 2, I analysed literature establishing technology as socially shaped and not sitting neutrally outside the effects of politics, culture and society. Such a position, which challenged a technological deterministic view, resonated with my analysis in the three previous chapters. My analysis developed iteratively from the areas I identified in the literature review; technology and teachers' personal pedagogy; technological determinism and performativity; technology and teachers' educational identities. From my presence at Brampton High as an ethnographer,

from using tools such as Tablet PCs, LCDPs and e-portal, from participating in activities such as RTR, MAM and SAA, I have some semblance of how technologies such as these *systemically* mediate, and change, what teachers do – that is, technologically mediated change is ecological change (Postman, 1992, p. 18).

For example, e-portal had a seismic effect on the pastoral care provision at the school. Introducing this technology mediated dedicated tutorial periods to become redundant with ecological consequences. Professional relationships between tutor and tutee were relocated from the physical to the virtual world. The school's management gave students a choice - students could participate in the virtual tutor system or not. The students chose the latter which left a *moral* void in the school's responsibility to them. I am suggesting that there are four overarching findings which go some way to explaining why Nicola and David experienced technology as they did. Key to these findings is the identification of the contradictions, which thwarted both teachers' attempts at attaining their objects. As I discussed in Chapter 3, contradictions emerge historically (Engeström, 2010, no page) through an activity system, and as such can only be explored indirectly through the manifestations of those contradictions as conflicts. The specific contradictions in both teachers' activities reflect in some way the general conditions of the school as a systemic whole.

Underpinning the findings is the conflict between the key informants, their activities, and technology. Both teachers' discussed how they struggled to 'fit' certain technologies into their activities without those technologies mediating radical change to both how and why they carried them out. Through presenting these findings, I challenge the notion that the micro effects of technology, which are unexpected or detrimental, are a consequence of human beings not using technology correctly. Not going with the 'technological flow' (Dale, *et al*., 2004, p. 456) can be presented as a cause for technological failure. I am suggesting that a non-critical acceptance of such a metaphorical 'flow' is as culpable as any human error in technological conflicts. Norman (1999, p. 40) writes that people tend to 'blame themselves' when such conflicts occur - there is a need to assign a causal relationship between their own actions and technological malfunction. What this cause and effect blame culture ignores is that technology is effected by the macro, such as culture, as well as the micro, the individual

accidentally clicking on the wrong icon. Technology is subject to complex interactions and relationships rather than having pre-determined outcomes.

My findings rely on technology being context-rich rather than context-free and, as such, inseparable from the conditions under which it is experienced. For Selwyn (2010a, p. 71), educational technology research should attempt to redress this imbalance, to make technology fairer - presenting these findings is my part in redressing this imbalance and can be summarised as:

- Educational technology at Brampton High mediated conditions of performativity
- The relationship between the school, Nicola, David, and technology was not in isolation from political, economic and social components
- Educational technology at Brampton High did not inevitably mediate Nicola and David's empowerment
- Educational technology did not inevitably, and successfully, mediate Nicola and David's relationships or communities at the school

In the rest of this chapter I explore more deeply what underpins these findings and relate them to the four technologies investigated. It is important not to make sweeping and unwarranted claims. Consequently, my findings should be seen as generated within the context of Brampton High, and through the experiences of two key informants - this is not to say that there might not be resonances between Nicola and David's experiences with other teachers both at Brampton, and in other UK schools**.**

Finding1: Educational technology at Brampton High mediated conditions of performativity

The literature reviewed in Chapter 2 reveals a 'feature-set' of issues related to technology, and technology in education, and these features are interlinked with cultural, social and technical considerations. The literature highlighted particularly how technology is part of mediating a performative educational system (Lyotard, 1979; Ball, 2001, 2003). The relationships between performativity, education and technology are multi-faceted. In Chapter 4 Nicola talked about

how the school, and particularly technology, was as much a sign for 'new' education as a tool to mediate learning. Nicola's comments resonate with what Gerwitz, *et al* (1995, p. 127) call the 'glossification of school imagery' – where the performative pressures of 'success' are reflected in schools portraying a 'high-tech' image, where productivity and efficiency are mediated by technological tools.

The analysis of the data in Chapters 4 to 6 offers an alternative to the techno-centric view that technological change is deterministic in its outcome, and that technology inevitably mediates teachers to be more productive, and thus better, at what they do. In the current techno-centric discourse, teachers are positioned as technicians who employ data and analysis – mediated by computers – to attain the performative goals set for them by management and government. There are number of consequences of the techno-centric and performative educational model. New managerialism, and the climate of performativity in schools, has had the effect of increasing teachers' workload, working hours and stress (Bartlett, 2004, p. 578). The imposition of performativity was reflected in a reduction in the levels that Nicola and David felt they were trusted. As Hartley (1997, p. 143) writes this was part of a reorientation of teachers work, and that the 'the professions were not to be trusted; rather they were subjected to contractual relationships'. What emerged from the literature was that performative reforms had a specific:

> …high-tech image. They are usually guided by an underlying faith in technical rationality as the basis for solving social, economic and educational problems. (Apple, 1996, p. xi)

My analysis suggests that the meditational relationship between technology as a tool, and performativity as an environmental state, was increasingly fundamental in the Nicola and David's activities. For these teachers, the practice of assigning quantitative values to human thoughts has become representative of 'learning'. Nicola and David spoke of how the relationship between quantitative data and technology, such as computers, mediated the judgment of schools. In doing so, technology mediated levels of 'learning' to be represented as numeric data – and where the most efficient means of producing, analysing and communicating such data was technology, specifically computer technology. My analysis leads

to conclusions which run counter to the celebratory commentary surrounding technology in schools - particularly with regard to unpicking the complexities regarding the mutual relationship between data as representation of educational success, and technology as the means of mediating the production of such data.

The culture in the school was one where, with the increase in data, there was a need to increase the number, speed, or ubiquity of technology capable of processing such data. This relationship was self-sustaining, omnipresent and powerful - and with it came a redefinition of Nicola and David's activities, for both informants the increased focus on (technology mediated) data resulted in a model where learning was not valued, *representations* of learning were valued. Moreover, the human qualities of love, beauty, intelligence and even 'normality' became either ignored or represented as data. For Nicola and David, technology and performativity were inextricably linked with each other, with the rise of the school's performative culture there also occurred a rise in the importance of technology in that culture.

The voices in the study have been articulating a different view on the technologies mediating their activities from those presented in the mainstream of educational technology research. Nicola and David painted pictures where technologically mediated performativity ignored relationships, context, and understanding of emotional as well as academic states. For these teachers, student attainment was a welcome outcome but not an end in itself. Nicola and David viewed their jobs, and the students and families they worked with, with great affection – this is a similar observation to that of Day (2007, p. 59) who writes about effective teachers and managers having 'a passion for education, for pupils and for the communities in which they worked'. Despite the demands of technology and performativity, all the informants I spoke with were committed to the school - rather than criticise the SLT, there was more an acknowledgement of the difficulties of the educational environment in which they all worked. That is not to say that both teachers were not frustrated by some of the technological and performative circumstances they faced.

The discourse of performativity, serves to pass progress to schools, and teachers, themselves - schools are then measured against centrally prescribed assessment tools such as higher test

results. This creates an ethos of individualism where schools (and in the analysis of MAM in Chapter 4, teachers) are in competition with each other. The 'language' of performativity, a language mediated by technological tools, has limited semantics for the positive things in schools such as pastoral work (as in David's SAA data in Chapter 5) or the support structures of teachers' communities (typified by Nicola's data regarding MAM and RTR in Chapter 4). Within a technologically mediated performative model, these values are silenced by the vocabulary of instrumental and formulaic achievements. Whilst the dominant discourse of performativity could be said to reward those schools and individual teachers who embrace the demands of the system - and in doing so embrace a techno-centric view of education and technology - this was not reflected in the data. Nicola and David found strength in the very communities and informal structures which were threatened, or ignored, by the technologically mediated context of performativity at the school.

Finding 2: The relationship between the school, Nicola, David and technology was not in isolation from cultural and social influences

In Chapter 1 I positioned this project as sociocultural - the interlinked nature of technology and culture has always been a focus of the work and manifested in various guises in the technologies I studied. The climate of performativity mentioned in the previous section is but one of the societal and cultural influences upon not just what educational technology is, but how it is used at Brampton. I examined a range of these influences in the review of literature – new managerialism and normalisation in educational management; technologically mediated 'joined up' approaches to child protection such as ECM; nationwide systems for mediating communication between teachers and schools as seen in NGfL. What my findings suggest is that these cultural and social influences have an ecological effect on teachers' experiences of technology.

Taking an SST position on technology suggests that social and cultural influences do not necessarily result in a 'neat' fit between technology and environment – technology mediates changes to the environment in which it is introduced as much as the environment changes the technology. This resonates with what Postman (1992. P. 18) emphasises as technological change being ecological – technology does not mediate change one single part of a schools

culture, there are wide spread changes to the entire culture of the setting. Part of this ecological change is reflected in how the technologies investigated mediated change to Nicola and David's activities. In MAM, technology mediated a shift toward a data reliant and audit based model of moderation. For these teachers, the technology mediating MAM changed an activity based upon informed professional decisions to one based upon technical statistical analysis. This change was not suggested by the school's SLT in isolation - this was a change emanating from the Government and which impacted on teachers' professional and personal lives (see for example, RTR in Chapter 4 and SAA in Chapter 5).

My observations of MAM show how the imposition of a technology (for example the use of the LCDP to present to colleagues) mediated not only change to the immediate activity, but to wider ranging parts of the school's culture. For example, the public presentation of MAM data removed moderation from a group activity, with a clear goal which would benefit all in the group, to one which was focussed on individual's performance being measured against that of their colleagues. In this instance, the drive for greater efficiency and output of the education system as a whole, became manifest in a specific activity within a specific school.

This shift had implications for relationships between colleagues, and on different communities. Most prominent of these was how Nicola and David reported the use of ROF for MAM data storage reflected an increasingly low-trust culture in education. The lack of trust mediated by different levels of access to data, and teachers feeling they could not access their *own* data, resonated throughout the school. Teachers at Brampton had to face challenging circumstances which depended on a feeling of trust in them by the school, and of the school by them. For Nicola and David, removing such a trust relationship from one part of the school effected trust relationships *throughout* the school.

As with MAM, RTR was also an activity which was the school's response to Governmental demands on the UK education system. RTR evolved from children and parents, being positioned by successive governments as consumers of education and empowered to have access to data regarding the product they were receiving. At Brampton, the technology mediating RTR played a vital role in increasing communication between the school and

parents, as well as parents' being able to access to 'real-time' data. For both Nicola and David this was desirable. However, RTR also resulted in conflicts between teachers and parents, and teachers and their colleagues, which arose due to inaccuracies in the data being accessed, and confusion arising from the use of inappropriate communication tools.

In RTR, technology mediated an activity which, whilst intending to empower parents, had in some cases the opposite effect – the over-reliance by some teachers on such a highly technological system removed the vital elements of human communication and analysis. The entering of data into the school's intranet triggered possible 'reporting' to parents of events. However, due to a number of factors, this data was not always accurate which had the result of bringing into doubt the reliability of the system, and caused confusion and stress for both teachers and parents. Indeed, the 'blind-faith' in the RTR technology demonstrated by some teachers appeared to remove their ability, or inclination, to contact parents.

For Nicola and David, the macro agenda of positioning parents and children as 'consumers' of education (and technology such as that mediating RTR in this) resulted in micro level effects on their activities and relationships. David suggested that the version of PMR investigated in this project reflected an increasingly performance led, and output driven, educational system. Although performativity appears to be the prime concept with regard to PMR, what was interesting was that all the teachers I spoke with - including active union members such as Nicola - advocated some type of system which managed performance and in doing so supported teachers in their work. However, for these teachers, it was the technical nature of the PMR process (mediated by technologies such as e-portal) which changed not just how PMR was carried out, but what constituted evidence of teachers' performance.

The attempts by the UK Government to protect the county's vulnerable young people were reflected in a number of changes to the workings of public sector services such as education, social services and the police. Initiatives such as ECM manifested themselves in a more 'joined-up' approach to the care of young people – at Brampton this was mediated by technologies such as e-portal and CMIS, and which redefined the school's entire pastoral system. For David, and other informants I spoke with, the wider social concerns which

underpinned ECM led to technology mediated systems such as SAA. None of the informants suggested that systems of pastoral care previous to SAA at Brampton were the finished article. However, the difference between SAA and previous pastoral care models was that these were developed through approaches to pastoral provision, not as a result of technological capability.

Previous to the availability of the technology mediating SAA, the tutor period could not have been removed from the school day due to the statutory need for registers of students' attendance to be taken. Technologies such as the TPC and e-portal mediated this registration process to be carried out in curriculum, rather than tutor time. Removing 'tutor-time' from the school day was an approach which developed from the technological capability at the school. However, it was instigated as a direct response to ECM, itself a response to wider social concerns.

Finding 3: Educational technology at Brampton High did not inevitably mediate Nicola and David's empowerment

Throughout this work, a picture has emerged of the ways Nicola and David experience technology corresponds to the writing of authors such as Postman (1992), Cuban (2001) and Selwyn (1999b, 2003, 2008). Nicola and David's stories demonstrate ways in which the 'sanguine air of technological determinism' (Selwyn, 1999b, p. 77) surrounding educational technology did not sit with the nuanced, and at times detrimental, changes to their activities. What I have found is that rather than technology mediating conditions where Nicola and David became more autonomous and empowered they have become less so. These teachers have increasingly become subject to wider social and cultural demands which regulate their activities. This is not to say that these demands are solely mediated by technological tools. My findings do suggest however, that the connectivity mediated by technology, and particularly the production, analysis and dissemination of data, has become more focussed on, and by, the demands of a performative education system.

The argument for performativity empowering, or disempowering, teachers is one which has been considered widely in the literature (see Ball 2001, 2003; Gleeson & Gunter 2001; Goodson *et. al* 2002; Hall & Noyes 2009; Hargreaves 1994a, 1994b). What this project has revealed is that technology has a fundamental role in mediating performativity at Brampton

High – and is similarly central in defining conditions of teachers' empowerment or disempowerment. In the review of literature I explored 'normalisation' (Foucault, 1980, p. 104). What my findings suggest is that technology, and technological systems, are tools which mediate the effects of normalisation in the school's management model. The use of technology and data to mediate evidence of performance and success has become a central part of Nicola and David's activities. Rather than this leading to technology mediating their empowerment, both teachers maintain that the opposite appears to be the case – they have become increasingly disempowered through the normalisation of a reward and sanction culture, and the removal of non-regulated activities which then leads to de-skilling.

Part of Nicola and David's feelings of disempowerment related to the demands placed on them by the meditational role of different technologies. A prime example of this was their use of DDLS for data entry. Implementing DDLs for activities such as PMR was initiated as a means of mediating a more efficient use of teachers' time. In actuality, the opposite was the case – these teachers found using the TPC 'pen' to touch the EVD resulted in numerous errors because of the design of the DDLs and the small TPC screen. Both Nicola and David learnt that using a wireless mouse reduced occasions of erroneous data entry. However, their resulting lack of confidence in the accuracy of data entered via DDLs resulted in them spending more time checking, and re-checking, data entries. That the EVD technology mediated the demands on Nicola and David's time to increase, led to them feeling disempowered by the very technology which would supposedly empower them. This, is in addition to the move toward the increased prominence of data – as in MAM - reduced what these teachers saw as their professional opinions. Disempowerment was also reflected in technology mediating surveillance which Nicola and David discussed as part of the normalisation inherent in the school's techno-centric culture.

For Nicola and David, technology such as RTR mediated systems which rendered data instantly part of the wider social and cultural context. In this model, entering test scores onto e-portal was no longer exclusively part of a relationship between teacher and student – indeed, technology was part of these teachers feeling they were being disempowered in this relationship. RTR mediated a 'real-time' data dissemination of data to a range of different

'stakeholders' – prime amongst these perhaps were parents. Nicola and David's disempowerment arose not from the object that parents should be able to access 'real-time' data as it was entered onto the school's intranet, but from the tools which mediated that activity. Both teachers were advocates of involving parents and wider agencies with the school. What these teachers were saying, was that there were fundamental issues with the integrity of the data mediated by technologies such as RTR and EVD.

Both Nicola and David insisted that technological systems mediated comparison of teacher against teacher, faculty against faculty and school against school. This of course is not necessarily a new phenomenon – such comparisons have been made for many years. What is different in this case is that Nicola and David felt that the instantaneous nature of technology left no time for *them* to reflect on what they were doing. They were producing so much data that they felt their ability to be a reflective professional was being diminished and that they were disempowered by this. The meditational role of technology in RTR became less one where applications such as a spread sheet was used simply to produce an analysis of numerical data. With the 'real-time' nature of RTR and the increased ubiquity, and power, of technology, Nicola and David experienced their work as becoming, less teacher, and more technology focussed – a movement which these teachers' experienced as ultimately was disempowering

Finding 4: Educational technology did not inevitably, and successfully, mediate Nicola and David's relationships or communities at the school

Whilst Nicola and David do express being part of communities of shared ideas and values, these communities are not necessarily sanitised and homogenous groups. Rather than community being an imposed, and technologically mediated, 'approach', for Nicola and David community was more about the 'in it together' spirit of 'communitas' (Jeffery & Woods, 1998, p. 146). It was important for them to be considered as individuals whilst at the same time feeling part of a community. However, for Nicola and David, the school's apparently techno-centric approach to education reflected a rise in 'corporate identity' (Ball, 2003, p. 219) rather than communitas. Technology was part of a centrally mandated drive toward formally organised, and industrially based, versions of teachers communities – comments which echoed Selwyn and Fitz's (2001, p. 127) analysis of the NGfL. Although at the school technology was

positioned as a tool which brought communities together, my analysis suggests that this was not always the case – as represented by the tensions between community members discussed by Nicola in Chapter 4 (MAM) and David in Chapter 5 (SAA).

What has emerged from my analysis is that Nicola and David's experiences of technological mediated communities reflect an increasingly corporate ethos at the school. Both teachers suggest that the school's technology mediated communities appear to reflect a misrecognised style of professionalism. Selwyn (2010b, p. 120) writes of the how technology appears to be mediating the 'new lives of teachers' with a particular focus on professionalism, collegiality and effectiveness. For Nicola and David, rather than these technologically mediated communities being based on group discussions where issues are considered deeply – discussions which might then challenge the school's position - such communities appear to be more concerned with systems and processes leading toward efficient work practices.

Both teachers considered that a consequence of this efficiency was that certain roles within their communities appeared to disappear – the technologically mediated communities surrounding SAA and RTR for example appeared 'on-message' and collegiate within the virtual world of email and e-portal, and yet were suffering conflicts within the physical world of the staffroom. There is evidence in the study that communities need 'maverick' characters to challenge what might be seen as threats to informal communities of practice (as reflected in David's approach to SLT membership and Nicola's union affiliation) and that the school's technologically mediated communities did not appear to have a place for such characters.

The data in the study depicts a school where technology increasingly mediated the relationships between community members. There were occasions where both Nicola and David rejected the school's imposed communities located in data, and mediated by technology – however, in doing so appeared to be doing something different to the norm. Both tecahers mourned the loss of the 'staffroom' not as a physical location but more as a philosophical and emotional community - for these teachers technology, along with the restructuring of the school buildings along the lines of 'staff bases' rather than a staffroom, mediated communities which were anodyne and sanitised.

Nicola and David's rejection of the prominent position of technology in mediating, and shaping, teachers' communities, resonates with Hargreaves (2003, p. 49) call for a similar rejection of the 'soulless standardization' of these communities. The technologies explored in the study all mediated, to a greater or lesser extent, reorientation of the communities to which Nicola and David belonged. Technology, and data, began to threaten the long term bonds in some of these teachers' informal communities, despite these bonds being part of the key relationships in schools:

> you can know the academic standards inside and out, and write the most creative lesson plans, but if positive, affirming, and mutually respectful relationships are not the norm in our classrooms, no learning will take place. Even academic knowledge must be distributed through social relations. (Amanti, 2005, p. 140)

The data in the study suggests that technology appeared to have had a detrimental effect on some of Nicola and David's work relationships - physical world dialogue between interlocutors was in some circumstances (such as those in SAA) replaced by 'virtual world' relationships mediated by email, text and Facebook. For Nicola and David, technology mediated communications and relationships were as 'real' as those in the physical world, however the skills, rules and practices were different – see for example the confusion regarding RTR messages in Chapter 4. For these teachers, the technologically deterministic assumption that appeared to position communities, and relationships, located in the virtual world as the same as those in the physical world appeared to be misrepresentative. This is not to say that Nicola and David were putting value judgments on these differences – rather, that both teachers thought it was important to acknowledge that such differences might exist.

The effect of technology in mediating professional relationships transferred to Nicola and David's professional communities - both teachers accepted that communities can be formed because of technology. However, both also highlighted that communities can continue *outside* of being technologically mediated. For these teachers, what was crucial was not acknowledging that the school had some communities mediated by technology and some that were not - for Nicola and David, what needed to be acknowledged was that those communities mediated by technology were reshaped by it. This reshaping was in many instances a positive result of

when technology mediated a community. However, Nicola and David were concerned that, for example, the SAA and MAM technologies not only mediated changes to the rules and practices of the communities involved in those activities, but also mediated conflicts between community members.

Both Nicola and David suggested that the technology mediating their activities had the potential to damage, and indeed to destroy, long established communities - the residue of the effects of technology on a specific community was not confined to *only* that community. Communities at Brampton High were made up of people with differing roles and responsibilities, the bus driver, the security guard, the groundskeeper, and technology mediated these communities in complex ways. The school had interrelated communities – technologically mediated change in one of these had potentially chaotic impact on others across the school. For both teachers the implications of the conflicts within the SAA or RTR systems were not confined only to those communities. These teachers were involved in multiple communities at the school – tensions and conflicts within one community migrated to others. The tensions which resulted from Nicola and David feeling less trusted because of ROF data storage effected more than those participating in the MAM community. The lack of trust moved through the entire school as the MAM community members took up their roles in other communities.

7.3 Conclusions

The findings I have presented are not intended to be definitive explanations of why Nicola and David experienced technology as they did. They are part of my critical examination of educational technology in a UK school. I am however aware that:

> Anyone who practices the art of cultural criticism must endure being asked, what is the solution of the problems you describe? (Postman, 1992, p. 181)

Whilst I am not suggesting that I have solutions, I have attempted to address what Apple (1996, p. 21) describes as the need for research to 'name the world differently', and in so doing 'assert the possibility that it could be different' (*ibid*). Naming technology differently at Brampton High is a case of challenging discourses where technology appeared to be both ascribed its own agency, and set within an embedded culture of performativity and

technological determinism. The four technologies studied were related to, and to different extents mediated, new managerialism, performativity and the restructuring of schools. However, what emerged from my analysis was that Nicola and David's experiences of technology had as much to do with it mediating changing roles, responsibilities, communities and relationships, as increasing efficiency, production and success.

Although a summary of my analysis would appear to suggest that all is not well with the four technologies examined this is not strictly the case. Both key informants advocated models of moderation; of performance management supporting teachers in their work; of communication between school and parents; and of remodeled pastoral and tutorial programs. Both teachers also advocated the potentially beneficial role technology might play in mediating these activities. Nicola Howard and David Sharma used technology frequently in their work - both made the choice to work in a school which had technology at the center of many of the activities which took place in it. These key informants suggested that whilst technology mediated changes to their activities, it also maintained structures mediating the *status quo*.

For these teachers technology - and the associated climate of performance, efficiency and production - mediated an environment which eroded the emotional, the abstract, and the ephemeral from a growing number of their activities. Rather than transform Brampton High's model of education, technology mediated tools of testing and systems of performance management. Technology was positioned as underpinning educational performance at the school and yet, and as I discussed in Chapter 3, the socio-economic factors of crime, and unemployment have little to do with technology but are major factors in the lives of some of Brampton's students. Both Nicola and David questioned the wisdom of the capital outlay spent by the school on technology (for example the £25,000 per classroom on hardware and software I discussed in Chapter 3) which appeared to ignore more pressing factors such as the physical and emotional wellbeing of the students in which this investment could have been made.

The techno-centric culture at the school could in part be explained by the level of spending on technologies – there was both a monetary and philosophical investment in technology which

would have been hard to characterise as unsuccessful. The levels of investment in technology might also go some way to explaining why it appears to have been ascribed its own agency – agency which privileges, what is after all a mediating tool, with transformational attributes. Such positioning of technology as itself a change agent ignores an acknowledgement that technology in schools cannot succeed without the skills and efforts of teachers:

> Without attention to the workplace conditions in which teachers labour and without respect for the expertise that they bring to the task there is little hope that new technologies will have more than a minimal impact on teaching and learning. (Cuban, 2001, p. 197)

Cuban links technology with teachers' working conditions, and students' learning conditions (see also, Worthen and Berry, 2006) - the pressures of the performative culture at Brampton High, and the technology mediating this culture, are reflected in a number of deep questions. For example, if technology was supposedly a tool mediating increased efficiency and production then why did Nicola and David feel so stressed and with so little time to complete their activities? Why did systems which supposedly enhanced and increased communication, mediate confusion and conflicts between members of the school's communities? Why were these teachers' experiences of the wide ranging and ecological effects of different technologies not acknowledged?

Perhaps to answer these questions it is necessary to examine how technology has appeared to mediate a reinforcement of the traditional notion of the 'school'. Ingersoll (2003, p. 20) suggests that the increased workload and stress teachers experience lies in the 'organisational characteristics and conditions' of schools. This can be seen in how technology has become increasingly central in mediating the organisation structures and conditions at Brampton High. Technology has mediated systems which have disempowered Nicola and David, de-skilled them and supported a 'conservative' educational model. This is in contradiction to the 'individualistic, anarchic, exploratory and disruptive' (Somekh, 2004, p. 169) potential of technology. For these teachers, technology appeared to actually mediate 'safe' methodologies and structures and was used to sustain – not challenge – existing practices.

From examining the data, and from the findings I have presented, my exploration of the realities of educational technology at Brampton High has led me to the following conclusions:

- Brampton High's model of moderation needs to include, and respect, teachers' opinions as much as rely on technologically mediated data as a means of quality assurance. Technology has a central meditational part to play in moderation but not so it becomes an end in itself.

- Communication between the school and parents needs to acknowledge that technological systems can mediate the presentation of confusing and inaccurate data – there needs to be a 'human face' in the relationship between school and home.

- The model of performance management at Brampton should reflect the abstract as well as quantifiable – technology should, and could, mediate an acknowledgement of the emotional work of teachers as much as the academic.

- Pastoral care is based on relationships. At Brampton technology mediated a curriculum which negated 'dead' learning time – however, students could benefit from a point in their day where the relationship between them, and their teachers, was based on tutor/tutee rather than teacher/student lines. Technology could mediate this relationship.

If this study has been at all successful, then my hope is that it might stimulate some reflections about educational technology about what it does, and about what it means. Technological and performative systems require 'clear minds and cold wills' (Lyotard, 1979, p. 62) - it was just this clarity of mind and coldness of will which, at least in part, described Nicola and David's experiences of educational technology. For these teachers, technology mediated an established technological hegemony supported by increasing prevalence, and *dominance*, of data and systems. Technology was not neutral in it effect - it had an ecological effect on the activities in which both teachers participated, and how and why they did them. Holding a position critical of technology, underpinned by a healthy scepticism as to its inventible benefits, can be seen as that of 'the loving resistance fighter' (Postman, 1992, p. 183). Postman (1992, pp. 183-184) suggests, such a person refuses to accept efficiency as the 'holy-grail' of human relations; who does not believe in the 'magic' of numbers; who does not confuse information with understanding; and who, whilst admiring the ingenuity of technology, does not take this as the highest possible form of human endeavour.

The model of the loving resistance fighter resonates with my own experiences of technology, and those of the two key informants in this study. Such a model reflects the need for a repositioning of technology within schools such as Brampton High and teachers' professional lives. The views of teachers are central in such a repositioning, so too rigorous and trustworthy research. Critically exploring how technology mediates teachers' activities is fundamental to understanding educational technology. However, championing such a critical view rests with

the efforts of what appears to be an ever diminishing community of loving resistance fighters. From my experience of this study, Nicola Harvey and David Sharma are two such fighters. I fear however, that theirs are voices which are increasingly unlikely to be heard.

Appendices

Appendix 1 Overview of ACT areas of investigation

	ACT Evaluation
Means/ends questions	Human beings have hierarchies of goals that emerge from attempts to meet their needs under current circumstance. Understanding the use of any technology should start with identifying goals, which are relatively explicit, and then extending the scope of the analysis both "up" and "down".
Environmental questions	Human beings live in the social and cultural world. They achieve their motives and goal by active transformation of objects in their environments. This section of the checklist identifies the objects involved in target activities.
Learning questions	Activities include both internal (mental) and external components, which can transform each other. Computer systems should support both internalisation of new actions and articulation of mental processes, when necessary, to facilitate problem solving and social coordination.
Development questions	Activities undergo constant developmental transformations. Analysis of the history of target activities can help to reveal the main factors influencing the development. Analysis of potential changes in the environment can help to anticipate their effect on the structures of target activities.

(Amended from Kaptelinin & Nardi, 2006, pp. 271-277)

Appendix 2 ACT means/ends and environmental questions

	ACT evaluation questions
Means/ends questions	• M/E-Q1. Are all target actions supported? • M/E-Q2. Is there any functionality of the system that is not used? If yes, what actions were intended to be supported with this functionality? How do users actually perform these actions? • M/E-Q3. Are there actions, other than target actions, that are not supported, but users obviously need such support? • M/E-Q4. Are there conflicts between different goals of the user? If yes, what are the current trade-offs and rules or procedures for resolving the conflicts? • M/E-Q5. What are the basic limitations of the current technology? • M/E-Q6. Does the user switch between different actions or activities? If yes, are there "emergency exits" which support painless transition between actions and activities, and, if necessary, returning to previous states, actions or activities?
Environmental questions	• E-Q1. Are concepts and vocabulary of the system consistent with the concepts and vocabulary of the environment? • E-Q2. Is technology an important part of work activities? • E-Q3. Are resources necessary to carry out target actions integrated with each other? • E-Q4. Is technology integrated with other tools and materials? • E-Q5. Are the technology characteristics consistent with environment?

(Amended from Kaptelinin & Nardi, 2006, pp. 271-277)

Appendix 3 ACT learning and development questions

	ACT evaluation questions
Learning questions	• L/C/A-Q1. Does technology require large amounts of time and effort in learning how to use it? • L/C/A-Q2. Does technology avoid unnecessary learning? • L/C/A-Q3. Is external knowledge easily accessible? • L/C/A-Q4. Does technology provide problem representations of user's activities that can help in goal setting and self-evaluation? • L/C/A-Q5. Does technology provide problem representations in case of breakdowns which can be used to find a solution or formulate a request for help? • L/C/A-Q6. Are there external representations of the user's activities, which can be used by others as clues for coordinating their activities in the framework of a group or organisation?
Development questions	• D-Q1. What was effect of technology on target actions? Did expected benefits actually take place? • D-Q2. Did users have enough experience with the system at the time of evaluation? • D-Q3. Is the whole "action lifecycle", from goal setting to the final outcome taken into account and/or supported? • D-Q4. Did technology show increasing or decreasing benefits over time? • D-Q5. Are users attitude toward technology becoming more or less positive over time? • D-Q6. Are there negative or positive side effects associated with the use of technology?

(Amended from Kaptelinin & Nardi, 2006, pp. 271-277)

Appendix 4 Participant consent form

Exploring Teachers' Experiences of Educational Technology: a Critical Study of Tools and Systems

Researcher Andy Clapham **Supervisors** Peter Gates, Tony Fisher

As you have been asked to participate and have accepted, the first and most important task is to thank you for your time. This form is to ensure that the ethical considerations concerned with social science research are clearly addressed. The research is conducted in accordance with the University of Nottingham's adoption of the British Educational Research Associations, *Revised Ethical Guidelines for Educational Research* (BERA, 2004) and the School of Education's support for the Economic and Social Research Associations Research *Ethics Framework* (ESRC, 2004). Both of these documents are available on the School of Education web site.

You are still in a position to decline participation in the research if you wish. Interviews will only be conducted after you have been given the opportunity to give full and informed consent for the research. This procedure will also clarify your position with regard to your right to withdraw, and the associated issues of use/non use of data generated up to the point of withdrawal. For this project all data generated up to withdrawal will still be used in the research; however, no further data will be generated. The research method will ensure the confidentiality, anonymity and non-traceability of research participants. Data storage will be undertaken in relation to the Data Protection Act, 1998 and will be stored in a location away from the school, and will not be placed on any data storage/intranet systems operated by the school. You will of course have full rights regarding access to any data generated by the research. If this is clear and acceptable then please sign and date bellow.

Signed …… (Participant)

Print name …… **Date** ……

Contact details

Researcher:	Andy Clapham -	ttxac14@nottingham.ac.uk
Supervisor:	Dr Peter Gates -	peter.gates@nottingham.ac.uk
	Tony Fisher -	tony.fisher@nottingham.ac.uk
Research ethics coordinator:	Dr Andy Hobson -	andrew.hobson@nottingham.ac.uk

Appendix 5 Introductory statement

The following are a few points of clarification about the project. I hope to be able to interview you on a number of occasions that are convenient to you. The aim of these interviews is to identify concepts related to your thoughts on technology at the school.

Who is conducting the research?

I am conducting the research as an individual researcher in accordance at the University of Nottingham School of Education.

Who is the research being conducted for?

The Research is being conducted as part of my PhD thesis at the University Of Nottingham School Of Education.

Who is funding the Research?

The research is being funded via a studentship from University of Nottingham School of Education.

What is the Research About?

During my 15 years as a teacher I have been privileged to work with truly inspirational teachers and students. I have been intrigued by the perceived role of technology, as the foundation of teaching and learning and it is these perceptions that I want to explore in the research. During the rise of technology in secondary schools millions of pounds have been spent on hardware, software and training to enable the technology to be as effective as both policy makers and manufactures would hope. However, as a teacher who has been through this change, I have no recollection of being asked what my perceptions were about technology and the role it plays in secondary schools. For the last five years I have worked as a teacher in one of the most technology advanced schools in Europe. Despite the investment in hardware, software and training, teachers at the school have not been asked for their perceptions of the impact of technology on their role. These questions are of great importance if educational technology is to be successful in secondary education.

Why is the research important?

The research is important due to the significance it carries for the teachers and management of the school and the wider educational community owing to the research school being a 'model' for many other such schools. Research, which explores teacher perceptions in this school, would have wider ranging implications for schools using the same underpinning policy structure. The research has personal significance as I have been in a position to witness the huge technological investment in the school. The research will allow me to develop both as a teacher and researcher and it will put me in a position to add to the body of knowledge regarding educational technology. It is important to stress the unique nature of the school regarding technology, and its physical and philosophical settings. As a result of this uniqueness the research offers gains in exploring the research methods used, in analysing the perceptions of teachers regarding a major policy initiative, and researching the roles of teachers in 'making or breaking' this policy initiative.

What data will be generated?

The world of UK secondary education is facing many changes. The fabric of what once constituted the National Curriculum is changing and with it perceptions and philosophy which underpin the application of policy decisions. Teachers are expected to use technology in every part of their role and it seems that this prevalence of technology has had an influence on the

evolution of what it is to be a teacher. However, these changes in relation to educational technology are based on school policy, which has not been consultative in derivation. Teacher's perceptions of how educational technology operates on the ground have a vital role to play in analysing the effectiveness of a multi-million pound investment. Teachers are developing new ways of using technology effectively in their practice and are exploring what it is to be a teacher in such a teaching environment. However, they are not asked why they have made these decisions. This needs addressing. Data generated will be via semi and unstructured interviews and will be qualitative in nature; the semi-structured interview data will be coded and analysed via Nvivo software.

What about confidentiality and anonymity?

The research is being conducted in accordance with the University of Nottingham School of Education ethics statement. All data will be anonymised and analysis will be conducted at an aggregate level.

Do I have to participate?

Participation is completely voluntary.

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